The IRON AGE

Vol. 159, No. 10 — March 6, 1947

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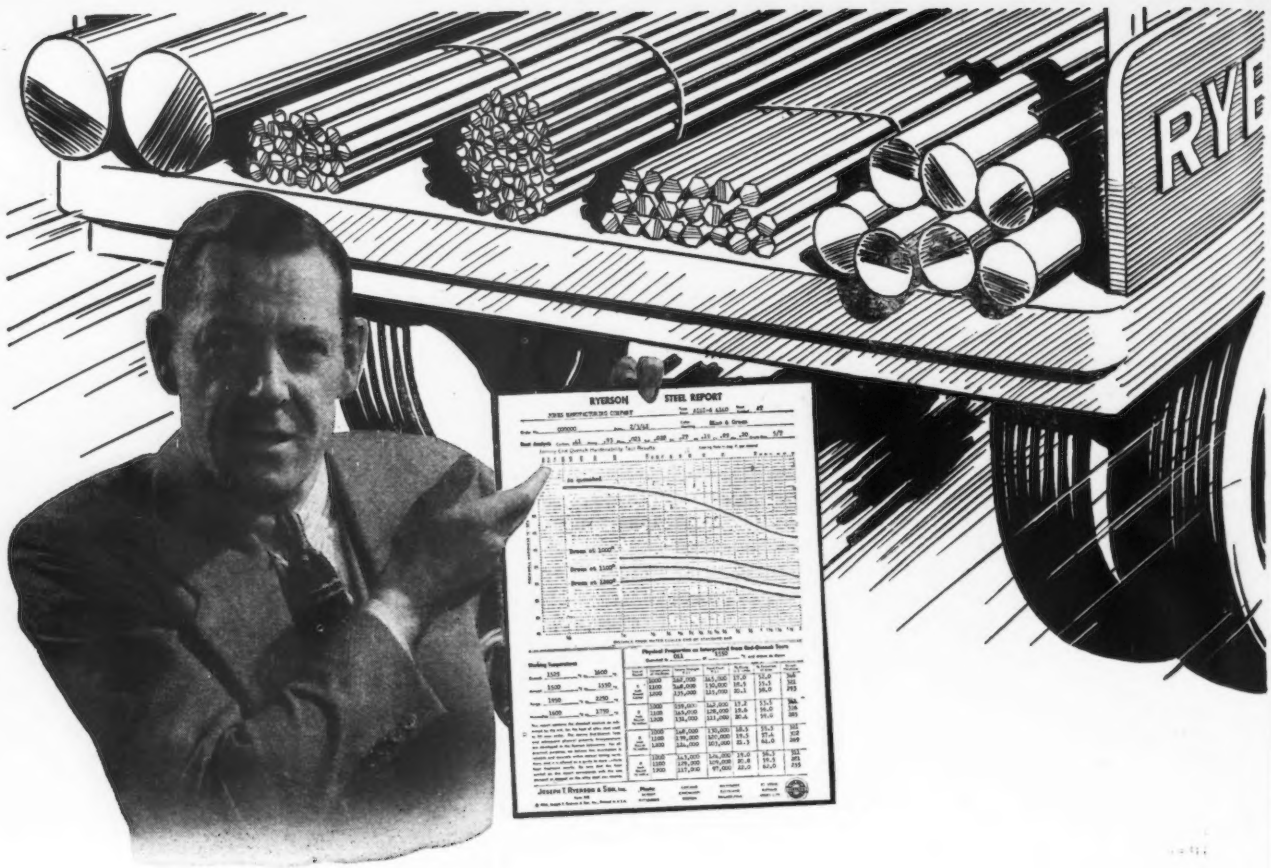

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It Doesn't Mean a Thing

THAT scratching sound blending with the March wind is the taxpayer at work. Like 'Liza crossing the ice, he's picking a precarious footing through Form 1040, adjusting his gross income, depreciation and such. What with the usual standard imaginative generosities under "contributions," some emotional and unfortunate emergency matters under "medical expenses," and plenty of miscellany under "miscellaneous," there's always some chance of a refund assuming substance and shape.

As the conflict between self-interest and duty ebbs and flows, one ear is cocked to Washington making like a tax reduction for 1947. If the taxpayer happens to be a beginner sparring with his first return, phrases like "balanced budget" must seem strained and unreal. After all, those words have never been uttered with serious intent during his entire lifetime. The older, more sophisticated and cynical taxpayer, hardened to the pitfalls and miscalculations of domestic budgets, is inclined to strike a more tolerant and skeptical attitude.

For a decade and a half the fiscal scene has been marked by gross inaccuracies in estimates of both revenues and expenditures. The 1947 revenue bill may be an exception, and perhaps deep tax cuts will be possible. If not, further painful inflation seems inevitable. The taxpayer's apparent lighter burden a year from now will be offset by additional dollar devaluation and consequent destruction of values in investments, savings, endowments, fixed incomes, insurance, trusts, and such.

With $200 billion down the drain to win a war, with each family in hock to the government (i.e., indebted to some other family) by some $7000, of future productivity, with unprecedented worldwide military commitments, with increasing domestic social burdens, the situation is one which seemingly demands the most resolute paring of expenditures and exploitation of regular and new sources of income. The next several years may see increases in and wider margins established between earned and unearned incomes. Congress may even find the courage to bolster initiative by easing taxes on profit as such while at the same time making tax-free business, cooperatives and societies pay their way.

Selfish and immediate self-interest dictates an energetic attack on the debt burden. It has been in the national tradition to energetically liquidate war debts rather than ungenerously throwing the burden upon posterity. The suggested payment of $1 billion on the debt in 1947, which presupposes a final payment sometime in the twenty-fifth century, hardly fits in this tradition.

Or, perhaps there are some taxpayers who subscribe to the comforting belief that debt doesn't mean a thing, that the people owe it to themselves. Influenced perhaps by a touch of inflation psychosis some rather responsible voices have expressed this viewpoint recently in Washington—that national debt repayment is a bookkeeping matter of balancing debits and credits, of taxpayers and bondholders. Those taxpayers believing this should find Form 1040 stimulating rather than onerous. The money they pay doesn't mean a thing—they're paying to themselves!

T. W. Lippert

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► High scrap prices and insufficient supply for current steelmaking rates are cutting down merchant pig iron supplies, while some foundries which get pig iron by allocation are using heavier pig charges. On top of this is a new and major headache for gray iron foundries--a shortage in and a deterioration of quality of foundry coke.

An eastern foundry experimenting with foundry coke substitutes is meeting with success in using 15 lb of pitch coke to each 200-lb coke charge to produce an iron running 3.30 to 3.40 pct C. Other foundries have been forced to turn to an admixture of anthracite and coke.

► Molybdenum seamless tubing is now available on a production basis for the first time. It is said to be readily machinable, easily worked and shaped, and can be welded to iron, nickel and similar materials.

► A Detroit manufacturer has been running exhaustive tests on the use of aluminum for auto underbody sheet parts, particularly with respect to welding. Results indicate such welding can be done with conventional equipment and without precleaning the clad aluminum sheet specified. Use of aluminum for this purpose is not looked for in 1948 models but may come at a later date.

► Productivity at the Manhattan project is said to have increased some 300 pct immediately after the first atomic bomb was dropped on Hiroshima--when the project's workers realized for the first time what they were doing.

► Development of a plastic safety goggle able to stop a sharp piece of steel at 240 mph is reported from the Midwest.

► The automotive world will not be surprised if comparatively high carbon steels are specified in the future for many deep drawing operations. With their higher carbon content these steels are reported not to abrade as easily as low carbon grades, thus reducing labor charges for hand-finishing.

► Faster handling of materials in process is one phase of the metal production and processing industries coming in for closer examination. Engineering firms report a great deal of interest in better methods for handling hot and cold materials in process to cut costs in the face of rising labor and material expense and the heavy customer demand for metals.

► The prediction has been made that 75 pct of bumper production for 1948 cars will be switched from the current hot forming to cold forming operations. The latter is said to eliminate much of the high labor cost of buffing and polishing prior to plating.

► Within the past few years 18 phenolic resin manufacturers have introduced phenolic resin core binders to cope with the acute shortage of dry cereal core binders.

► Prcducers of heating equipment for metal processing industries indicate that foreign demand is growing so rapidly that it may surpass domestic demand by the end of this year.

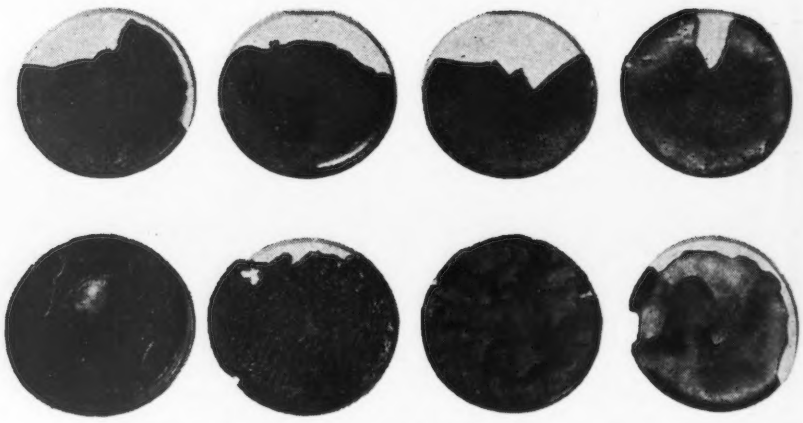
► Stainless steel filters produced by prealloyed stainless steel powders are now produced in a variety of shapes and porosity ranges with average pore openings of from 165 microns to 4 microns. Their purpose is to increase the life of filters handling acids and caustics.

► Reports at the end of the first month of Czechoslovakia's 2-year plan for reconstruction of its industries indicate many successes in meeting quotas among the steel-consuming industries. But the nationalized basic iron and steel industries are hardly mentioned with respect to their attainment of January quotas.

► Based on figures compiled through October 1946, the government has realized 38.5 pct of acquisition cost on all surplus disposal. On the sale of steel plants the figure is 36.9 pct.

► Electronic bombardment is a new method now used to clean optical glass surfaces prior to coating. It is used primarily by Bausch & Lomb to assist in the application of aluminum, the reflecting agent, to television and other first surface precision mirrors. The operation is carried out with high voltages in a vacuum chamber.

Basic Openhearth Slags



STANDARD chart of slag pats used for plant slag control: V= CaO/SiO_2. The from left to right as follows: greater than 2, 2.1 (12.58 FeO), 2.3 (13.00 FeO), over. The bottom row indicates shiny bottom slags with V values reading left to 1.9 (10.00 FeO), 2.0 (11.40 FeO).

By K. L. FETTERS and E. W. MAHANEY

Special Metallurgical Engineer and Metallurgist, respectively, Youngstown Sheet & Tube Co., Youngstown

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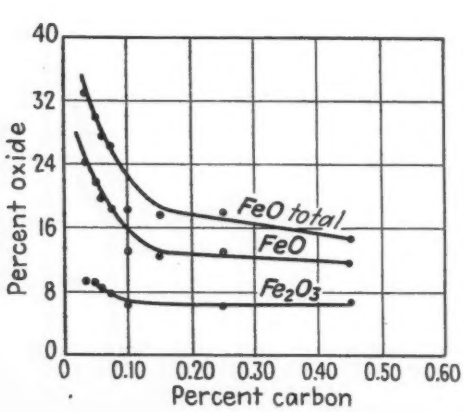
THE experienced openhearth steelmaker, his eyes trained through years of experience, gages the consistency of the slag from its color and the manner in which the bubbles burst and burn. He takes a test spoon of the slag, pours it on the floor and notes its ease of flow and its lumpiness. He then expresses his quickly judged opinions as to whether the heat is shaped up or whether further additions or time are required. In such rapidly-made tests, and based on his knowledge of the approximate temperature of the heat and its approximate chemical analysis, he is summarizing, to a remarkably satisfactory degree, the facts which in the following text will be discussed in a more technical manner, but which in the final consideration merely apply numerical measures to his judgment and testify to the skill of his art.

It has been rightly said, "Make the slag and the steel will take care of itself." However, only a thorough consideration of the many factors involved will give the optimum control of production rates and steel quality for the many varied practices and grades of steel now found in openhearth shops.

One may look to the twenties and thirties to find the beginning of scientific slag control, when many analytical measures of oxidizing power, basicity, etc., were developed. It seems that passage of time has served to emphasize less the importance of any specific analysis in favor of a better overall understanding of the makeup and effects of slag, so that more closely controlled judgment may be practiced.

Basic openhearth slags are essentially solutions of oxides of calcium, silicon, iron, manganese, aluminum, magnesium and phosphorus, with sulfur present in the form of sulfides of calcium, iron, manganese or magnesium. At openhearth operating temperatures, there are undoubtedly compounds, or at least definite molecular associations of these oxides present which have a pronounced effect on the physical chemical reactions between slag and metal. In addition to these liquid components of the slags, there are usually present varying amounts of such oxides or compounds in a solid state, either rather well dispersed throughout the liquid slag, or in larger agglomerates or lumps, depending on the "maturity of the slag."



LEFT

FIG. 1 — Average iron oxide content in slag as related to carbon in the bath. Total FeO content is determined by calculating total iron in slag to ferrous oxide.

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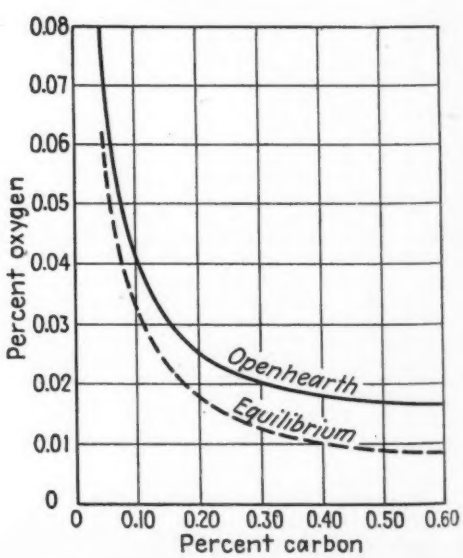
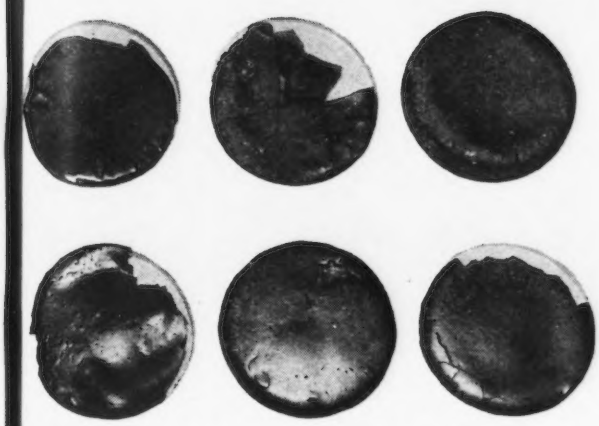
RIGHT

FIG. 2 — Carbon-oxygen relationship for equilibrium and for openhearth conditions.





top row indicates dull bottom slags, with V values reading 2.5 (15.87 FeO), 2.6 (15.87 FeO), 2.7 (21.80 FeO), 3 and right as follows: less than 2, 1.0, 1.6, 1.7, 1.8 (8.00 FeO).

Although the effect of slags on oxidation of basic openhearth steel is considered less important today than in the past, a thorough consideration of the many factors involved in slag-metal relationship is necessary to give optimum control of steelmaking rates and quality. In this, the first part of a two-part article, the authors initiate a critical review of (1) chemistry, (2) mineralogy, (3) control, and (4) operating significance of various slags.

The sources of the various slag constituents are evident; (1) calcium oxide from the limestone and burnt lime charged, (2) silica from the oxidation of silicon in the scrap and iron, (3) iron oxide from the oxidation of iron, and (4) phosphorus, sulfur and manganese, essentially from the scrap and iron, although the fuel is not to be overlooked as a source of sulfur. Alumina and magnesia are not present in appreciable proportions, and enter the slag from the fluxes and refractories. These various slag constituents, the reactions between the slag and metal and their effects upon the products of the openhearth, constitute the subject of this article.

Several characteristics of slags that may be readily measured or judged, an indication of what they mean in terms of production and quality, and what may be done to effect the desired degree of control, are listed as follows:

(a) *Slag Volume*—The term volume is somewhat of a misnomer, since it is slag weight that is calculated and is actually the factor considered. When the lime boil is nearing completion in a typical openhearth furnace, the temperature is likely to be about 2700°F and the metal is usually covered with a blanket of several inches of slag. Not only must heat be driven through this insulating layer of slag to raise the bath temperature to approximately 3000°F, or higher, but control of the chemistry of the heat must be effected by diffusion of the various slag constituents to the slag: metal interface. Even earlier in the heat, during the formation of the slag, the transfer of heat to the metal and the reactions taking place have necessarily progressed through the slag layer. It is evident that there is an optimum slag volume for a given grade of steel and shop practice. This volume must be enough to give the desired control of bath chemistry but not so much as to increase too greatly the time required to make the heat. Control of slag volume is attained principally by careful balancing of the limestone or burnt lime (charged and added to take care of the chemical requirements of the scrap and metal charged) and the chemical requirements of the steel being made. It might be pointed out in this connection that the openhearth usually must accept scrap and iron within fairly wide limits, and although it should not be thought that their composition is unimportant, the openhearth is doing its best job with the materials furnished only when it is using the very minimum of lime necessary to yield a satisfactory control of chemistry in the final products.

(B) *Slag Basicity*—The most important basic oxide of the slag is lime (CaO), and the most important acid oxides are silica (SiO_2) and phosphorus pentox-

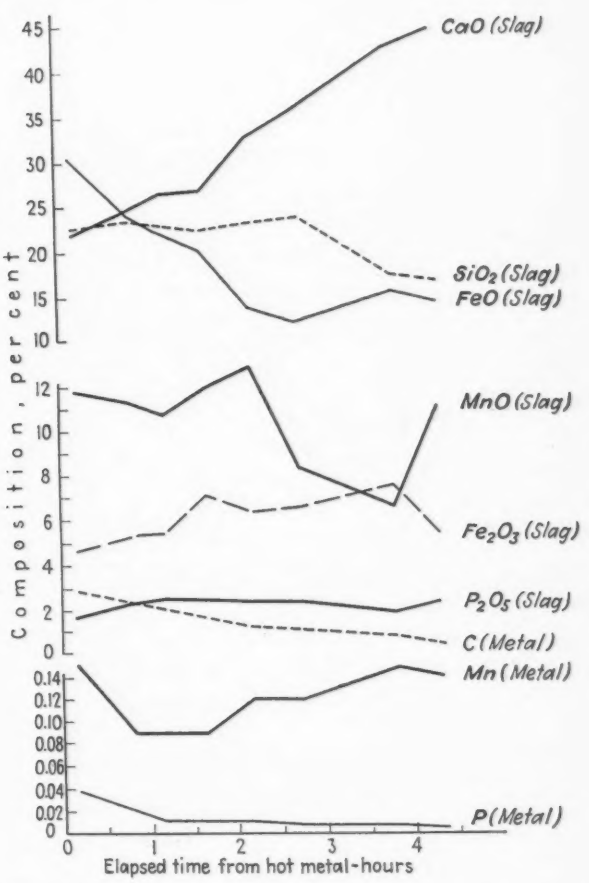


FIG. 3—Slag and metal compositions of a typical heat from time of hot metal addition to tap.

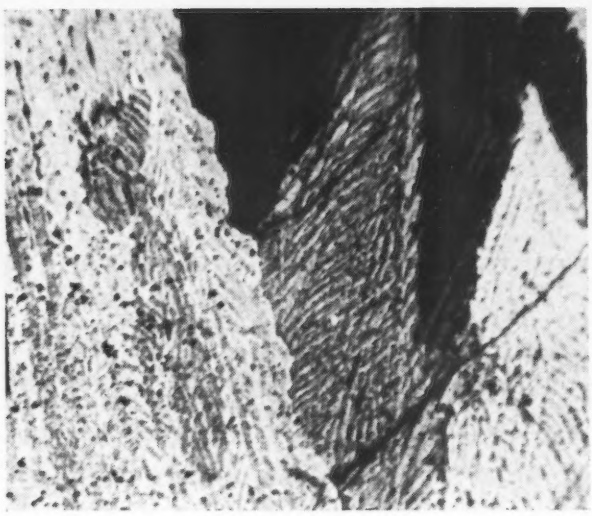


FIG. 4—Photomicrograph of an early Olivine or Monticellite slag. 150X.

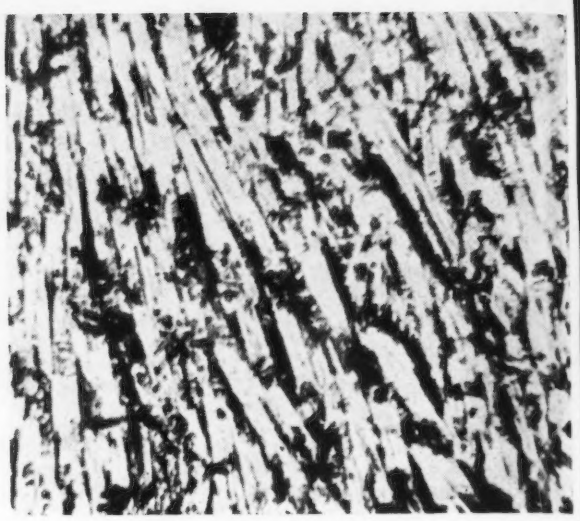


FIG. 5—A transition slag between Olivine and dicalcium silicate. The mineral is probably Merwinite. 150X.

ide (P_2O_5). It is usual to express basicity of the slag either as a ratio of the lime to silica ($CaO:SiO_2$), or by a corrected basicity value, often called a *V* ratio. One of the various corrected measures of basicity is the *R* value[1] where:

$$R = \frac{\text{pct CaO}}{\text{pct SiO}_2 + 0.634 \times \text{pct P}_2\text{O}_5}$$

It is evident that the primary means for control of basicity lies in the lime or limestone charged or added to balance the acid oxides of silicon and phosphorus contained in the scrap and the iron. Temperature, in its effect upon the solution of lime in the slag, as well as the judicious use of fluorspar, is also to be considered, since only the lime in solution is effective.

(C) *Oxidizing Power*—The authors hesitate to classify slags as to oxidizing power, since, in practical openhearth operation there appears to be little relation between the so-called oxide in the slag and the oxide in the metal. The slag serves only as a medium of transfer of oxygen from the furnace gases to the metal. The iron oxide in the slag varies during the working of a heat and has often been used as an index of the iron oxide content of the steel. However, recent studies[2] would tend further to confirm the belief which is becoming generally accepted, that there is little relation between the iron oxide (FeO) in the slag and that in the metal. Carbon in the bath approaches equilibrium with iron oxide (FeO) in the steel, and in turn an equilibrium is established with the slag; so it follows that the oxide in the slag is proportionate to that in the metal, as shown in Fig. 1. The basicity of the slag, however, alters these equilibria so that the more basic the slag, the more FeO in the slag, for a given degree of oxidation of the steel. Thus, an accurate estimate of the oxidation of the steel, as judged from the amount of FeO in the slag, is feasible only if the slag varies within narrow ranges of basicity. While this would be an ideal case, one must face in practice much wider variations in basicity, and hence the carbon content of the steel offers the best means of estimating the oxidation of the bath, unless one is equipped to determine FeO in the metal directly by some method such as that proposed by Derge.[3]

Fig. 2 shows the relation between carbon and oxygen in the openhearth bath under equilibrium conditions. It is to be noted that the oxygen in the bath is always above the equilibirum value established by Marshall and Chipman,[4] and for practical deoxidation control, oxygen in the steel may be satisfactorily estimated from the openhearth curve for which the following equation[1] is given:

$$\text{Pct FeO} = \frac{0.0124}{\text{pct C}} + 0.050$$

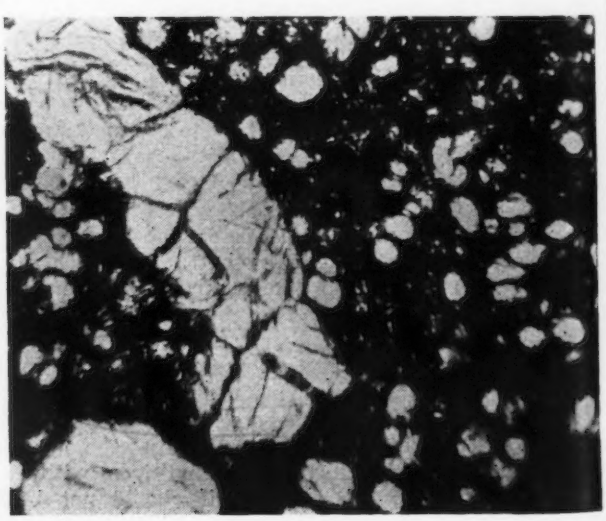
TABLE I

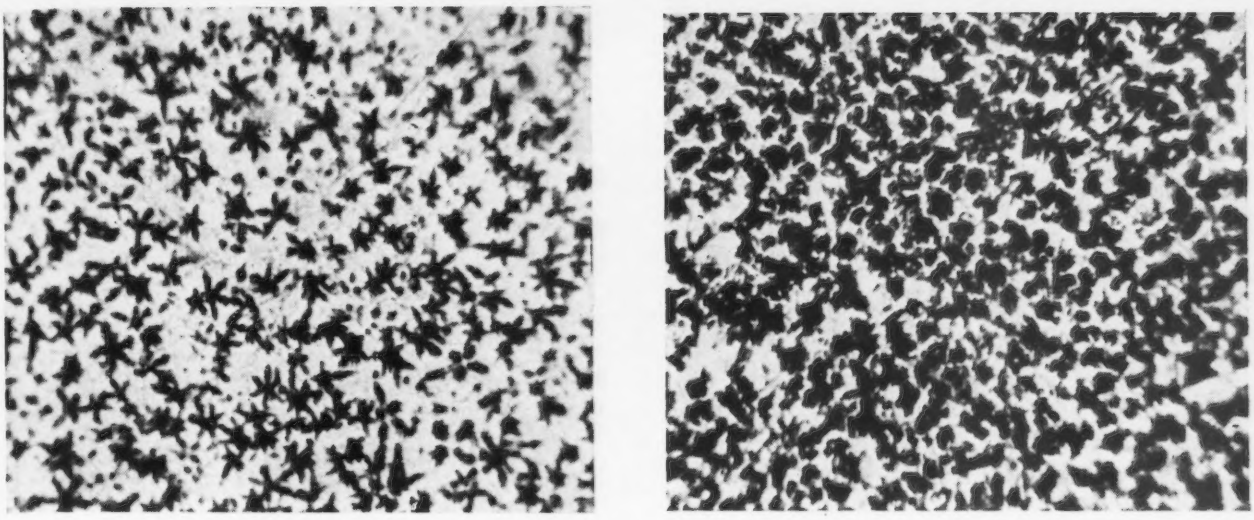
Average Iron Oxide in Metal as a Function of Carbon

Carbon, Pct	0.030	0.035	0.040	0.045	0.050	0.055	0.060	0.070
(FeO) metal Pct	0.453	0.404	0.360	0.325	0.298	0.275	0.263	0.227
Oxygen metal Pct	0.100	0.090	0.080	0.072	0.066	0.061	0.058	0.050
Carbon, Pct	0.08	0.09	0.10	0.12	0.14	0.16	0.18	0.20
(FeO) metal Pct	0.205	0.188	0.174	0.153	0.139	0.128	0.119	0.112
Oxygen metal Pct	0.046	0.042	0.039	0.034	0.031	0.028	0.026	0.025
Carbon, Pct	0.25	0.30	0.35	0.40	0.50	0.60	0.70	0.80
(FeO) metal Pct	0.100	0.091	0.085	0.081	0.075	0.071	0.068	0.066
Oxygen metal Pct	0.022	0.020	0.019	0.018	0.017	0.016	0.015	0.014

FIG. 7—Photomicrographs showing (a) dicalcium silicate slag with lime.

a





a b

FIG. 6—Photomicrographs showing (a) early dicalcium silicate slag with B less than 2.0, and (b) a slag slightly more basic than "a" and showing more free iron oxide replaced by CaO in silicate phase. 150X.

Table 1[1] gives the percentage iron oxide in the steel for several typical carbon contents of the bath. This table may be used directly for control of additions of aluminum or other deoxidizers. When so used, one should determine from experience the amount of deoxidizer sufficient for a given grade of steel when heats are tapped at some specific carbon content. When in practice, heats vary above or below the selected value of tap carbon, the amount of deoxidizer used should be decreased or increased in proportion to the variation of the FeO in the steel as estimated from the table for the above equation.

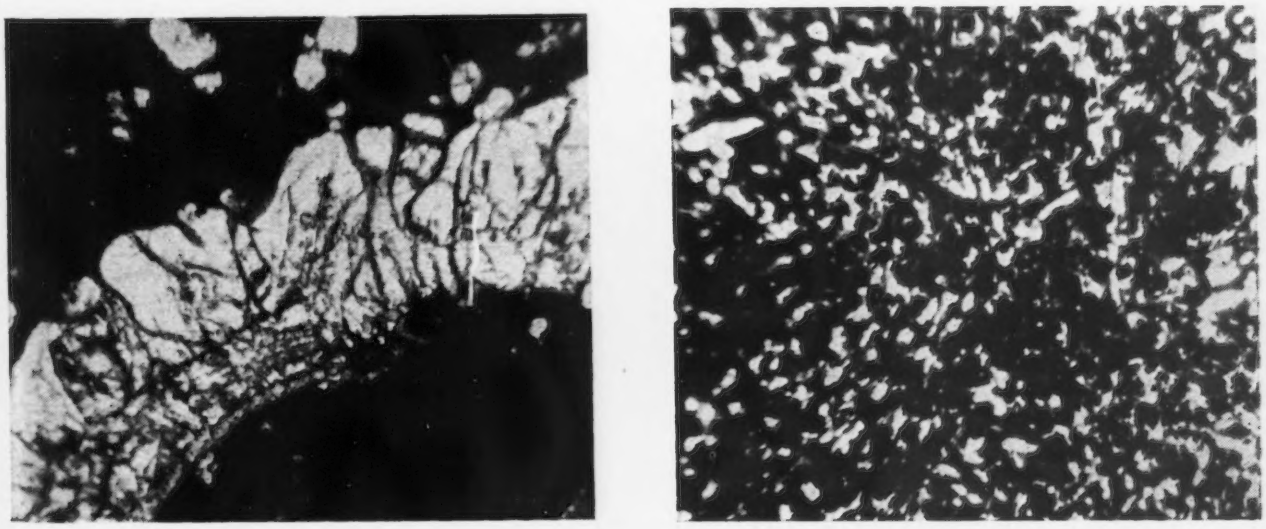
(D) *Slag Fluidity*—The reactivity of a slag is considerably affected by its viscosity, which determines the rate of diffusion or transfer of the reactants. Slag composition, temperature, the presence of fluxes such as fluorspar, and the presence or absence of undissolved constituents, all affect slag viscosity. Viscosity may be evaluated by the use of the Herty-Christopher "Viscosimeter,"[8] although since viscosity is related to slag basicity, temperature, etc., there are many who consider control of these primary variables a better approach to the slag control problem than by viscosity control. It should be mentioned at this point, that there are almost as many methods of practical slag control during the working of a heat as there are steel plants and there is little to be preferred among the various methods so long as they accomplish the desired degree of control in the particular shop concerned.

Mineralogy of Openhearth Slags

Basic openhearth slags, when allowed to cool and solidify, form crystals of minerals appropriate to their compositions and condition. These mineral constituents may be identified by the usual methods of mineralogy and petrography. While such studies represent postmortems of liquid slags, and the chemical combinations found to exist in the solid slag are known to be dissociated to varying degrees in the molten slag, such mineralogical examinations serve to cast considerable

lumps of dicalcium silicate which have not been in solution in liquid slag, (b) a ring of dicalcium silicate surrounding a lump of undisolved and (c) a mature dicalcium silicate slag from a well "shaped up" heat.

b c



light on the high temperature characteristics of slags.

In order to consider the mineralogy of slags, it is useful to picture the formation of the slag in a typical heat on the basis of a balance of the various materials entering the charge. In this example it will be considered that a 40 pct hot iron—60 pct scrap heat is being made, so as not to complicate the calculations with the possible variable amounts of flush slag in a higher iron and ore-charged heat. The figures given are all shown as pounds per ton of iron, plus scrap in the charge.

Material	*Lb*	*Composition, Pct*
Scrap charged	1200	0.45 Mn 0.020 P, 0.05 Si
Iron (hot metal)	800	1.50 Mn, 0.200 P, 1.38 Si
Limestone	127	55 CaO
Burnt lime	7	95 CaO

At the time this heat is ready to tap, the total slag weight will be of the order of 170 lb per ton and its composition will be as follows; SiO_2—17.0 pct, FeO—

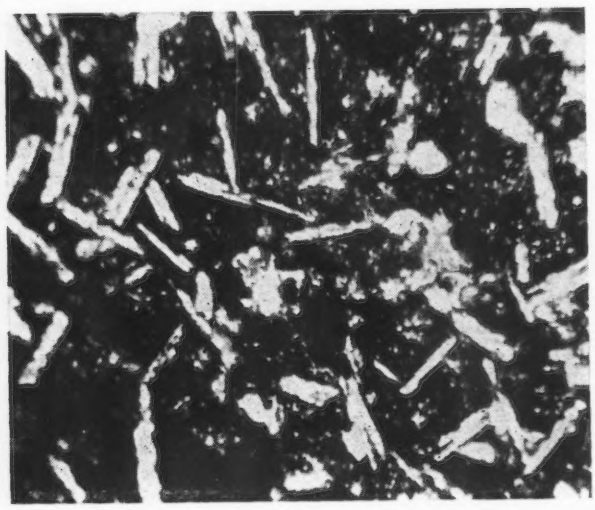


FIG. 8—Photomicrograph showing a tricalcium silicate highly basic slag. 150X.

14.0 pct, Fe_2O_3—5.0 pct, MnO—11.0 pct, CaO—45.0 pct, and P_2O_5—2.3 pct.

Fig. 3 shows the log of such a heat from the time of the hot metal addition to the point that the heat is ready for the final furnace additions. The changing compositions of slag and metal may be noted.

In the foregoing, an example has been given of the changing composition of the slag during the span of a typical openhearth heat. The mineralogical changes during the same period may be followed by means of microscopic observation of polished thin sections of slag samples.

The recent works of Jay,[6] and Rait and Goldschmidt,[7] represent very thorough studies of the minerals occurring in basic slags. In this article, however, only the more significant minerals from the standpoint of practical control will be discussed. One notes an important difference between English practice slags and those generally found in this country. The P_2O_5 content of the English slags is frequently in the neighborhood of 10 pct whereas American slags are usually under 3 pct. As might be expected, English petrographers pay considerably more attention to the occurrence of phosphorus-bearing minerals, which are not readily evident in this country and so are of minor consequence.

The mineral phases most readily noted in American solidified slags are the following:

(1) *Free RO Phases*—The oxides of iron, manganese and magnesium form a series of solid solutions of the general type (Fe, Mg, Mn)O. In addition to the single RO oxide phase of this type, it has been found in certain slags that two or more discreet compositions of such oxide phases may be noted.

(2) *Monticellite — $CaO{\cdot}RO{\cdot}SiO_2$ (Olivine)* — This mineral is observed in early slags and cannot occur to any degree as the CaO/SiO_2 ratio approaches 2/1. In early slags, the oxide phase will tend to be combined in the lime silica monticellite, but as the lime comes up and enters into solution in the slag, the RO is replaced by CaO, which change may be noted in the thin sections described later.

(3) *Calcium ortho silicate (Dicalcium-silicate) $2CaO{\cdot}SiO_2$*—This mineral begins to occur in quantity as soon as the slag composition approaches a 2/1 CaO/SiO_2 ratio. It has a high melting point and is frequently present in slags in the solid state until the temperature becomes sufficiently high to effect its solution. The following reaction occurs:

$2CaO$ (dissolved) + SiO_2 (dissolved) = Ca_2SiO_4 (solid)

Very frequently, lumps of lime will become coated with dicalcium silicate, formed in accordance with this reaction, occurring at the lime: slag interface. Subsequent solution of such coated lumps of lime is difficult and must be accomplished by higher temperatures and judicious use of fluorspar.

(4) *Tricalcium silicate, $3CaO{\cdot}SiO_2$*—This mineral is readily observed in highly basic slags approaching a 3/1, CaO/SiO_2 ratio.

(5) *Free lime, CaO*—This phase is often found in immature slags, particularly those over 2/1, CaO/SiO_2 ratio, and in slags where its solution has been hampered by rings of dicalcium silicate, as noted above. The British report free lime precipitated during freezing of the slag samples, but the authors have not definitely identified such a precipitated phase in the samples examined.

(6) *Dicalcium ferrite, $2CaO{\cdot}Fe_2O_3$*—This phase may frequently be observed in highly basic slags of high FeO content such as are found often in low carbon heats.

In the photomicrographs of a series of slags, figs 4 through 8, are shown typical structures illustrating the minerals described above.

References

[1] K. L. Fetters and J. Chipman, Trans. AIME 140, 170-203 (1940).

[2] T. E. Brower and B. M. Larson, Metals Technology, September 1946.

[3] G. Derge, Trans. AIME, Vol. 154 (1943), p. 248.

[4] S. Marshall and J. Chipman, Trans. ASM, Vol. 30, 1942, pp. 695-746.

[5] C. H. Herty, C. F. Christopher, H. Freeman and J. F. Sanderson, Bulletin 68 Coop. Mining and Met. Investigations, 26-28 (1934).

[6] A. H. Jay, Journal Iron & Steel Institute, Vol. 151 (1945), p. 505.

[7] J. R. Rait and H. J. Goldschmidt, Journal Iron & Steel Institute, Vol. 151 (1945), p. 391.

The authors will continue their discussion of petrographic studies, slag-metal relations, and slag control methods, in a subsequent issue.—Ed.

Intergranular Corrosion Determination

Development of a cyclic test for measuring intergranular corrosion in aircraft materials caused by gasoline containing lead halides is discussed herein. In an effort to evaluate the factors responsible for failures of supercharger nozzle boxes, several types of stainless steels and Inconel were subjected to a laboratory duplication of actual corrosion conditions.

o o o

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o o o

THE corrosion that often develops in alloys operating at temperatures above 1200°F, when the source of heat contains lead halides, can now be measured with a considerable degree of accuracy. A cyclic-type test, developed at the Thomson Laboratories, of the General Electric Co. to determine the factors behind the failures of aircraft supercharger nozzle boxes, is the basis of the evaluation.

The conditions under which this type failure occurs has made the testing and duplication of conditions difficult. While the aircraft is on the ground, condensed moisture or rainwater is in contact with the metal. At the beginning of flight the water is swept or evaporated out, leaving solid halide. During flight, with exhaust gases passing through it, the nozzle box material reaches a temperature of about 1200°F. At the end of flight, the material air cools to surrounding conditions and during idleness can again accumulate water.

The test itself is founded upon laboratory duplication of conditions that cause the corrosion. Success of it is indicated by the fact that metallographic specimens of test samples have shown the corrosion and the lead halide deposits reproduced exactly. Analyses of typical metals tested and showing the corrosion are listed in Table I.

In the cyclic experiment, types 316, 347 stainless steels, and Inconel, were tested because their relative merits had been previously realized by actual operational evaluation. Three heats of each were used, and each of the materials had three types of heat treatment. Each piece of metal, ¾ x ¾ x 1/32 in. was placed in a 250-ml beaker containing 150-ml of distilled water and 5 g of $PbBr_2$. The beaker was then placed on a hot plate and allowed to evaporate slowly to dryness and bake for 5 to 10 min. The temperature of the solution was maintained between 140° and 160°F and 12 to 16 hr were required for complete evaporation. The solution was stirred approximately every 2 hr. After baking, the dry piece was placed in a shallow quartz boat and heated for 1 hr at 1200°F in a muffle furnace. The sample was allowed to air cool and was then transferred to the original beaker again. Distilled water (150 ml) was added and the cycle repeated until, in all, three evaporations and three heatings were completed.

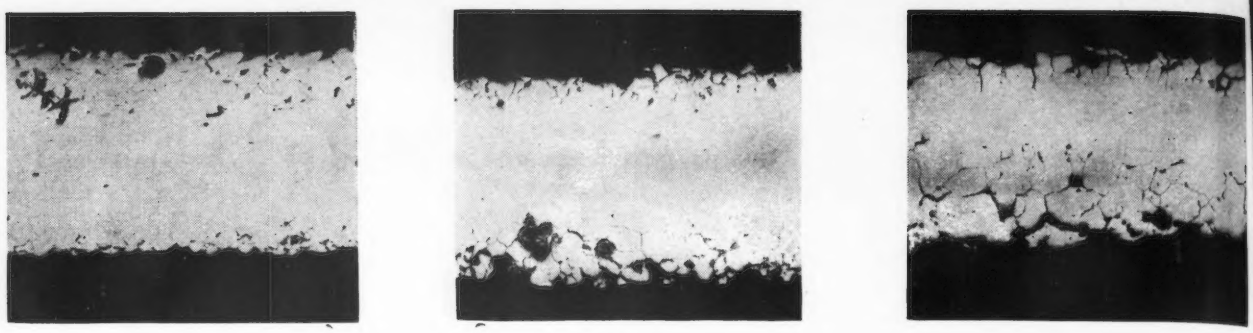
After completing the prescribed treatment, each sample was cross-sectioned, mounted in bakelite and polished. Examination was made with a microscope, a filar occular system and an 8 mm objective. The intergranular attack (grain boundary fissures) was measured in mils by using the filar eyepiece. The maximum depth was recorded and the length of every fissure along the cross-section was examined to obtain the average depth, which in itself was the best means of estimating the extent of the attack.

The surface condition (irregularity, pitting) was

TABLE I

Chemical Analyses of Materials Subjected to Cyclic Test

Material	C	Si	Mn	Cr	Ni	Mo	Cb	P	S	Ti	Cu	Fe
Type 310	0.25	0.50	1.25	25	20	....	....	0.025	0.025	....	....	balance
Type 316	0.08	0.25	1.75	18	13	2.25	....	0.04	0.04	....	....	balance
Type 321	0.07	0.50	1.75	19.5	10	....	....	0.04	0.04	0.60	....	balance
Type 347	0.10	1.25	2.00	19.5	10	....	1.00	0.03	0.04	....	....	balance
Inconel	0.15	0.50	1.00	13.5	balance	....	....	....	....	....	0.50	9



a b c

FIG. 1—Typical photomicrographs showing extent of intergranular corrosion in type 316 stainless steel. The heat-treatment conditions as noted in table II are as follows: (a)—"P" condition, (b)—"R" condition, and (c)—"S" condition. 100X.

measured after the microscopic examination on the following basis:

(1) Even—approximate total variation in surface level of 0 to 0.5 mils.
(2) Intermediate—approximate total variation in surface level of 0.5 to 1.0 mils.
(3) Irregular—approximate total variation in surface level of 1.0 to 3.0 mils.
(4) Very irregular—approximate total variation in surface level in excess of 3.0 mils. Grains missing.

The quantity of intergranular fissures was determined after the microscopic examination on the following basis:

(1) None less than one average fissure every 25 grains.
(2) Few—approximately one average fissure every 10 to 25 grains.
(3) Intermediate—approximately one average fissure every 5 to 10 grains.
(4) Many—approximately one average fissure at every grain boundary.

TABLE II

Summary of Cyclic Test Data

Material	Heat Treatment[1]	Depth Max	Intergranular Attack, Mils: Avg. Max	Avg.	Avg. of Avg.	Quantity[2]	Surface Condition[3]
316.....	P	7.4	....	2.7	....	D	D
316.....	P	9.4	....	4.7	....	E	D
316.....	P	5.4	7.4	2.7	3.3	C	B
347.....	P	7.4	....	4.2	....	E	D
347.....	P	6.1	....	2.7	....	D	D
347.....	P	5.9	6.4	3.1	3.3	C	D
Inconel..	P	1.6	....	0.5	....	E	B
Inconel..	P	1.2	....	0.5	....	E	B
Inconel..	P	0.7	1.1	0.3	0.4	B	A
316.....	R	13.5	....	8.1	....	E	D
316.....	R	10.0	....	6.8	....	D	C
316.....	R	8.8	10.7	6.8	7.2	C	D
347.....	R	4.2	....	2.1	....	C	C
347.....	R	2.7	....	2.1	....	C	D
347.....	R	6.3	4.4	2.1	2.1	D	D
Inconel..	R	1.6	....	0.9	....	C	C
Inconel..	R	1.3	....	0.5	....	C	B
Inconel..	R	0.9	1.2	0.3	0.5	B	B
316.....	S	12.0	....	8.1	....	E	D
316.....	S	10.0	....	5.4	....	E	D
316.....	S	13.5	11.8	8.1	7.2	D	D
347.....	S	7.4	....	4.2	....	D	C
347.....	S	7.4	....	4.2	....	D	D
347.....	S	10.8	8.5	4.2	4.2	E	D
Inconel..	S	1.1	....	0.7	....	C	C
Inconel..	S	0.7	....	0.3	....	B	B
Inconel..	S	0.4	0.7	0.1	0.3	B	A

[1] *Heat Treatment:* P—annealed at 1950°F; R—annealed at 1950°F, sensitized for 4 hr at 1200°F, air cooled; S—annealed at 1950°F, stabilized for 24 hr at 1500°F, air cooled.

[2] *Quantity of Intergranular Fissures:* A—none; B—few; C—intermediate; D—many; E—very many.

[3] *Surface Condition:* A—even; B—intermediate; C—irregular; D—very irregular; grains missing.

The data and typical photomicrographs (fig. 1) shows the measurements and the extent of the corrosion caused by this cyclic treatment.

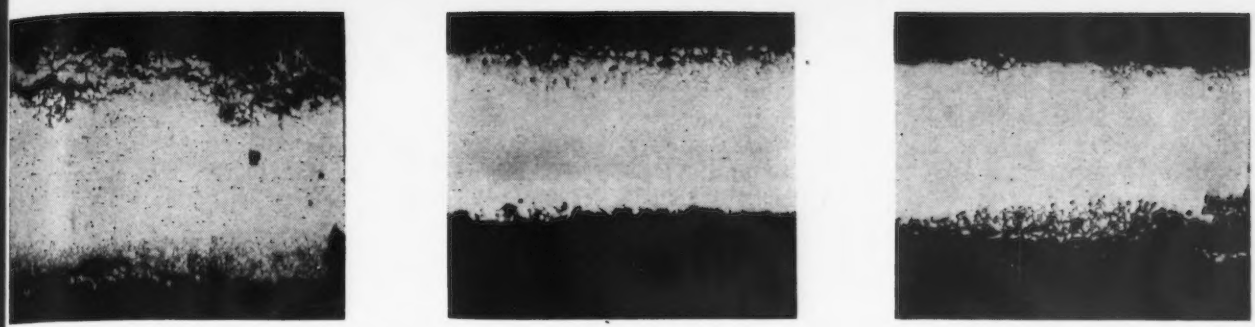
The data listed in table II indicate that Inconel was found considerably superior to the stainless type 347, which in turn was superior to type 316. This relation was consistent for both maximum and average depths of attack and the quantity of intergranular fissures which developed during the test for all preliminary heat treatments. On the basis of surface regularity, Inconel was the best and types 316 and 347 proved similar in nature.

The test results for types 316 and 347 confirm the stabilization theory with regard to the addition of the carbide forming element columbium; alloy 347, which contains columbium, showed less attack than type 316. On the other hand, the stabilizing heat treatment (1500°F for 24 hr, air cool) for type 316 material proved to be unsatisfactory, since the type 316 material which was allegedly stabilized exhibited approximately the same amount of attack after test as the same material sensitized prior to test (1200°F for 4 hr followed by air cool). The annealed condition proved to be the most desirable for type 316.

Since the cyclic procedure actually involved a sensitizing treatment at the end of each cycle (1 hr at 1200°F), the advantage of the annealing treatment must have developed in the first cycle of the test. The 1200°F and 1500°F treatments conducted on type 347 and Inconel did not significantly affect their resistance to corrosion, as compared to their resistance in the annealed condition. This is in agreement with present under standing of these alloys, that they should not be susceptible to sensitization in the manner of type 316 material.

In addition, a fume and a static test were developed, and although inconclusive, that is, resulting in no corrosion in the samples being tested, are interesting because of their relationship to the cyclic test.

In the former method pure lead bromide ($PbBr_2$) was distilled out of a small quartz retort and the fumes allowed to pass over a small piece of the heated alloy. The individual samples were placed in a 10-in. quartz tube of about ½ in. inside diam; the tube was wound with a Nichrome wire and



a b c

FIG. 2—Typical photomicrographs showing extent of intergranular corrosion in type 347 stainless steel. The heat-treatment conditions as noted in table II are as follows: (a)—"P" condition, (b)—"R" condition, and (c)—"S" condition. 100X.

covered with asbestos tape. By means of a ground joint, union was made of this tube with the retort. The leads from the wires were connected to a variable resistor and source of current, and an ampere v. temperature calibration was made to control the tube and contents at 100°F-increments between 1100°F and 1500°F. Each of the metals received three different heat treatments prior to the test, namely, (1) metals as received, annealed at 1950°F, (2) treatment (1) plus 1200°F sensitization for 4 hr and air cooled, and (3) treatment (1) plus 1300°F sensitization for 4 hr and air cooled.

With all five alloys used, 75 individual tests were made. In addition, another run was made on each of the five materials, heat treated three ways as a sort of "blank" by distilling the lead bromide over the samples originally placed in the tube at ordinary room temperature. The data as compiled from numerous photomicrographs, indicate that lead bromide fumes, by themselves, do not cause any significant corrosion of the surfaces of the typical metals. Unfortunately, in the test setup it would have been difficult to supply both H_2O and $PbBr_2$ in the vapor phases. The very slight corrosion that did occur on some of the metals may have been due to a small amount of moisture in the $PbBr_2$ or to small amounts of lead oxides in the halide. In any event, the conclusion can be drawn that dry, lead halide causes no significant attack on the metals used, and this can probably be extended to include alloys of a similar nature.

It has long been a theory that corrosion of metals in the field (for example, nozzle box material for superchargers) may be caused by condensate or rain water and lead halide being continuously in contact with the metals at ordinary temperatures. The hypothesis was that the halide would hydrolize to yield fairly strong hydrobromic acid and weak lead hydroxide:

$$PbBr_2 = Pb^{++} + 2Br^-$$
$$2H_2O = 2(OH)^- + 2H^+$$
$$PbBr_2 + 2H_2O = Pb(OH)_2 + 2H\,Br$$

The acid would then react with the metal, causing further hydrolysis to acid in a continuous process. In making the static test, however, it was believed that although the reaction could occur, the speed with which it was possible negated the theory at ordinary temperature conditions. It was further thought that hydrogen peroxide might catalyze the reaction since small amounts of H_2O_2 are present in rain water.

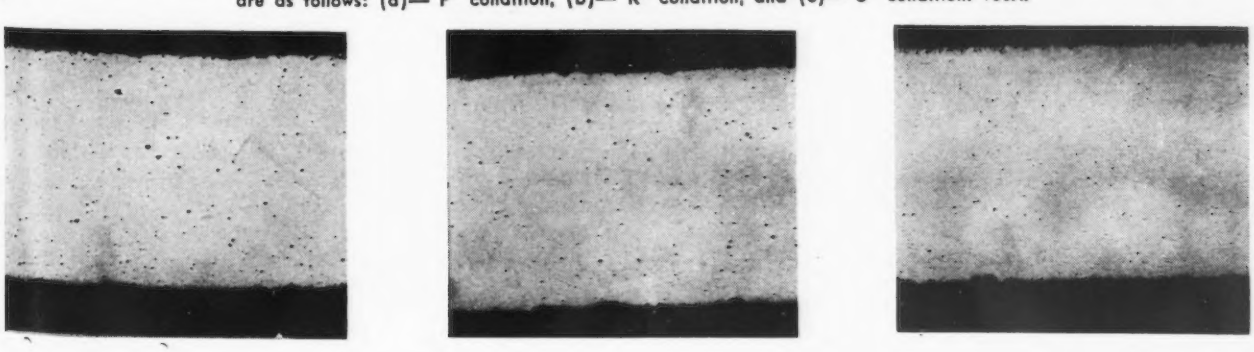
For the test both $PbBr_2$ and $PbCl_2$ were used. To this end, pieces of the five metals, ¾ x ¾ x 1/32 in., each with heat treatments, same as previously indicated, were placed in glass beakers and allowed to set idle at room conditions for about 30 days as follows:

(1) 5 g $PbBr_2$ and 150 ml distilled H_2O, (2) 5 g $PbCl_2$ and 150 ml distilled H_2O, (3) treatment (1) plus 1 ml H_2O_2 (3 pct), and (4) treatment (2) plus 1 ml H_2O_2 (3 pct).

Photomicrographs of the specimens, after the various exposures, again indicated that no significant attack took place on any of the materials and that the results were similar to those obtained with the fume test.

Evaluating the investigation as a whole, the cyclic test probably proves the hypothesis that the lead halide hydrolyzes at elevated temperature to a nascent acid capable of attacking the "stainless

FIG. 3—Typical photomicrographs showing extent of intergranular corrosion in Inconel. The heat-treatment conditions as noted in table II are as follows: (a)—"P" condition, (b)—"R" condition, and (c)—"S" condition. 100X.



a b c

materials." The intergranular corrosion in nozzle-box material is caused by the combination of water and lead halide on the surface of metal that has been made receptive to corrosion by certain heat treatment. The test also showed that lead halide fumes did not attack the heated materials and that water and halide do not attack the materials when in contact with them at ordinary room temperature.

If this test is to be applied successfully, a number of samples of the same material must be tested to eliminate extraneous factors and incidental results which could be interpreted erroneously. The test can probably be successfully applied to other high temperature applications where fuels containing lead halides are used, if care is taken to simulate actual field conditions as much as possible. The test as applied to nozzle-box material, will be useful in predetermining and predicting the performance of newly developed alloy materials. In this particular case, the best method for determining corrosion resistance of a new material would be to compare it, using the cyclic test, with Inconel, which shows a minimum amount of corrosive attack.

Acknowledgment

The author acknowledges the invaluable assistance of D. W. Bainbridge, research laboratory, and the late K. K. MacKenzie in the preparation of this manuscript.

German Wartime Technical Developments

REPORTS of German practice in numerous technical fields of interest to engineers and executives in the metalworking field, issued recently by the Office of Technical Services, Washington, are briefly described below. These reports are in addition to detailed articles of certain phases of German practice previously published in THE IRON AGE. Copies of the reports listed below may be obtained in either photostat or microfilm form, as indicated. Orders for copies of these Reports should be addressed to Office of Technical Services, Department of Commerce, Washington 25, D. C., giving the "PB" identification number. See THE IRON AGE, June 27, p. 67, Aug. 29, p. 39, Sept. 26, p. 80, Oct. 10, p. 80, Oct. 10, p. 67, Nov. 14, 1946, p. 81, and Jan. 9, 1947, for a list of earlier reports.

Locomotives—A passenger engine with individual axle drive instead of the usual driving rods, a new type of locomotive boiler and a locomotive that uses the boiler feed water over and over are included among the developments described in these five reports on the German locomotive industry. *PB-19670; photostat, $1; microfilm, 50¢; 1 p.*

Lens Coating—Two German processes for depositing hard nonreflecting coatings on optical lenses are described in this report. One of the processes involves evaporation of the coating material in a vacuum and the other the use of a hydrogen flame. *PB-23013; photostat, $11; microfilm, $2; 152 p.*

Precision Grinding—A precision grinding machine with an optical system which enables the operator to compare his work with drawings as the work proceeds has been received from Germany by the OTS and is available for examination and testing by American manufacturers. The machine is used for making templates, forming tools, cylindrical forms, and other complicated shapes. Manufacturers interested in examining or testing the machine should communicate with *Carl Hoffman, Chief, Material Unit, Technical Industrial Intelligence Div., Office of Technical Services, Dept. of Commerce, Washington 25, D.C.*

Small Diesel Engine—Plans for a two-cylinder, 25 hp, air-cooled diesel engine for the German light automobile "Volkswagen," are described in this report. The diesel unit was intended to be interchangeable with the gasoline engines used in the "Volkswagen," although no engines were built. *PB-36282; photostat, $4; microfilm, $2.*

Precision Castings—Advantages of economy, quality and simplicity obtainable by precision casting of gas turbine diaphragms are described in this report discussing experimental wartime production of gas turbine diaphragms by the American Brake Shoe Co. in which three methods of casting the part were tested —core assembly, investment and composite. *PB-31210; microfilm $2.00; photostat $4.00; 51 p.*

Galvanizing and Scale Removal—Reduction of dross in metal galvanizing and methods of removing scale from rolled steel wire are discussed in two German technical monographs now available. Twenty-five of the most important factors influencing the formation of hard zinc and dross in hot-dip galvanizing are discussed in one paper. Hydrochloric and sulfuric acids are compared as pickling agents. The report also gives suggestions for improving plant operation. *PB-44677; microfilm $1.00; photostat, $3.00; 34 p. PB-44662; microfilm $1.00; photostat $1.00; 15 p.*

Oxygen Production—A German method for making oxygen inexpensively for commercial uses is described in these two reports. The production method is based on fractional distillation of liquid air, or the Linde-Fraenkl process. Linde and Linde-Fraenkl processes for oxygen production are described in an English-language report, *PB-368; mimeographed 25¢; 31 p.* A supplementary report is Linde-Fraenkl Oxygen Apparatus, *PB-44664; photostat $1.00; microfilm $1.00; 14 p.* Further information on the liquefaction of gases is contained in a microfilm record in German, *PB-45592; microfilm, $6.00 enlargement prints $97.00; 968 p.*

Foundry Washes—Blackwashes, mixtures of graphite and other powders suspended in oil and water and used to protect sand molds in the foundry industry, are described in this report by Edmund R. Thews. The report gives requirements for blackwashes for different metals and alloys and presents information on items to consider in selecting the blackwash materials for any particular casting job. *PB-40348; photostat $1.00; microfilm $1.00; 15 p.*

Giant Gear Generator Cuts Rolling Mill Pinions

RECENTLY completed by Dominion Engineering Works, Ltd., Montreal, Canada, is a pair of pinions for a 44-in. blooming mill on which the teeth, of ½ DP, were generated on a Dominion herringbone gear generator. Specifications for these pinions were: 6.283 in. CP, ½ DP, 22 teeth, 3.6 in. depth of tooth, 44 in. PD, 66 in. face, 17 ft 10 in. overall length. Each pinion weighed 30 tons and was made from cast alloy steel containing 0.40 to 0.50 C, 0.85 Mn, 0.30 to 0.35 Mo, 0.75 to 0.90 Cr. Before machining they were air cooled and drawn to 220 to 260 Bhn.

Pinions of this size have been made before with the teeth cut by end milling, but as far as is known the generating process has never been used to cut ½ DP teeth.

The machine used was a planer type generator specially designed and built by Dominion for use in cutting continuous herringbone gears up to 20 ft diam and 66-in. face width. It differs from most generators in that the cutters are oil hydraulic operated by the two cylinders set at 120° included angle as shown in fig. 1. Cutter block guides are fixed, and 30° single helical or 30° continuous herringbone gears can be cut. Operation of the cutter drive is by means of a variable stroke hydraulic pump located in the main sump tank and driven by a 50 hp motor. The pump delivery is controlled from a panel located on the operating side of the machine, and the control dial is graduated in feet per minute cutting speed for the tools.

The machine is designed to use 30° rack type cutters approximately 18 in. in length. Sunderland standard cutters with backing plates are used, and roughing cutters are made from No. 6 Leda steel and are equipped with three inserted teeth. Finishing cutters have only two teeth. In operation, the cutters are fed into the blank by means of the inching traverse control. When the desired depth is reached, the operator closes the feed start button. Power feed then commences and moves the cutting head upwards through the space of one pitch. The feed is then automatically stopped, and both cutters withdraw out of the blank to the starting position. The reindexing then starts up, lowering the cutter head slightly in excess of one pitch. Thereafter, the compensating mechanism reverses the index motion, removing the excess downward travel, and at the same time takes up the inherent slackness in the gear mesh. During this period of step-back travel the gear blank remains stationary. A new cycle then commences, and both cutters make one stroke each, removing any possible interference left in the previous cut before the feed starts. All operations are controlled automatically, and all controls are positively interlocked.

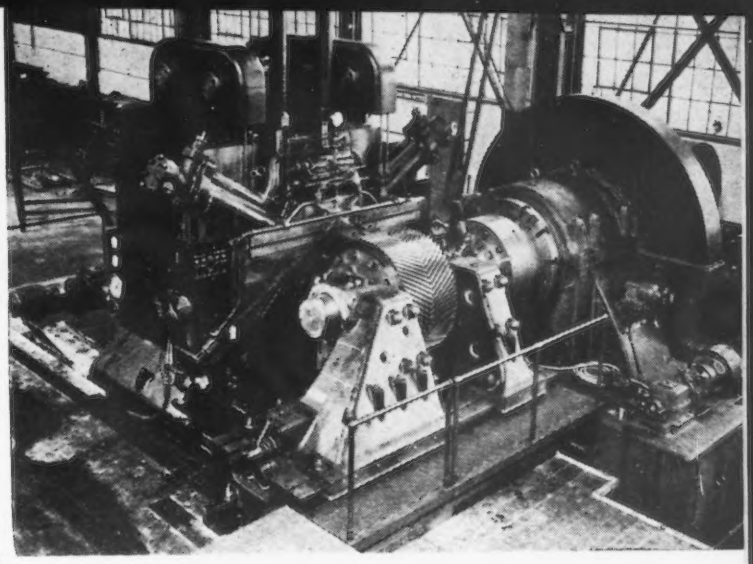
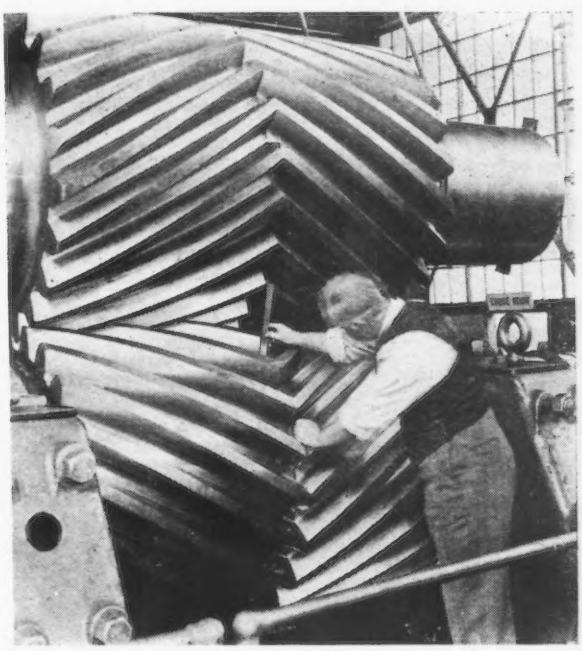


FIG. 1—Specially designed for generating the teeth on very large gears and pinions, this Dominion machine makes use of hydraulically operated cutters.

The machine is designed to cut 30° herringbone teeth on gears up to 20 ft maximum pitch diameter, of 60-in. width face. It will generate all pitches between 7 DP and ½ DP. The number of strokes per tooth is entirely independent of the feed, and a very fine finish can be obtained, as shown in fig. 2, by using a very fine feed and running the cutters at a fairly high speed. The overall width is 24 ft, and overall length 37 ft. The shipping weight, not including auxiliary equipment, is 410,000 lb.

Each of the pinions described required 280 hr to cut, which represented a considerable saving over previous production methods. The machine itself was substantial enough to take cuts at least ½ in. deep, but due to the relationship between the cutter length and the pinion face width, only ⅛ in. deep cuts were practicable.

FIG. 2—The magnitude of the finished teeth and the high quality of the finish are clearly visible in this illustration.



Aluminum Hand Truck Cast in

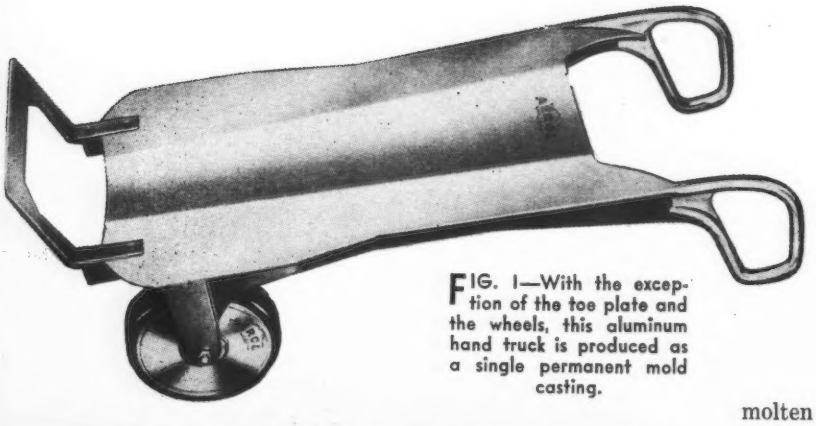


FIG. 1—With the exception of the toe plate and the wheels, this aluminum hand truck is produced as a single permanent mold casting.

FIG. 2—Cleaning the permanent mold preparatory to casting. Note the mold locking and tilting mechanism.

FIG. 3—Dust and carbon soot is blown from the mold after it is heated and the mold coating applied.

CASTING aluminum in permanent molds involves many engineering problems not encountered in normal foundry operations. This is particularly true in the casting in permanent molds of the hand truck apron shown in fig. 1. This casting measures 60 in. long by 22 in. wide, weighs 63 lb, and is, to our knowledge, one of the largest castings produced in a permanent mold.

The outstanding difficulty in casting aluminum in permanent molds is the shrinkage which takes place in aluminum between its molten and its solid state. The iron molds are made from a close textured cast iron, and Meehanite appears to give better results than any other material tested to date. The molds are so designed that the aluminum casting may be removed from the mold as soon as it has solidified.

The aluminum casting contracts as it changes from liquid to solid, but the iron mold expands as the molten aluminum is poured into it. The problem is to coordinate these movements in such a way as to obtain a casting free from shrink spots, misruns, blows and porosity. This is accomplished primarily by proper gate design, proper coating application and proper venting.

In some cases air blasts are applied to various points on the mold to obtain proper solidification sequence. Gating is most important as the casting must draw metal from the gate to replace its shrinkage.

Gravity feed permanent molds should always be set, for pouring, in a position which permits the molten aluminum to follow the gate to the bottom of the casting cavity before entering the cavity, thus pushing the entrapped air up as the molten metal rises in the cavity. This entrapped air is then released by proper venting.

The problems of large permanent mold castings are much greater than small ones, and this is particularly true of a casting such as the hand truck shown in fig. 1. This piece is 60 in. long by 22 in. wide, has cross ribs up to 3 in. deep and a solid sheet of aluminum (alloy 356) connecting these ribs. It weighs, finished, 63 lb. As the cross ribs are held rigidly in the iron mold, and as the shrinkage of the top of the truck as it changes from the liquid to the solid is approximately 0.4 in., the long way, the problem has been to keep molten aluminum fed into the cavity at the proper places to take up this shrinkage.

The mold assembly for casting this hand truck weighs approximately 5000 lb and consists of five individual molds. The main body of the truck is cast between two halves of the mold, the top half, 35 x 74 x 4.75 in., weighs approximately 1800 lb, and the bottom half, 35 x 74 x 5 in., weighs approximately 2300 lb. These two sections are visible in fig. 2.

The wheel forks are formed by iron cores which accurately fit holes in the bottom half of the mold and slide in and out by means of racks and pinions. Each handle is formed by a core divided in half vertically, each half operated by a rack and pinion so that the

in Permanent Mold

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two halves can be separated, allowing the truck casting to be removed from the mold.

The two halves of the main mold are hinged together at the lower end, the bottom half of the mold is mounted on a trunnion and the top half connected to vertical supports of the frame by means of an arm pivotally mounted at both ends. This is clearly illustrated in fig. 3. The whole mold assembly is so balanced in its frame, between the supporting arm, the hinge and the trunnion, that it will assume a natural rest position with the two halves of the mold open about 2 ft and can be opened or closed further with just a slight force.

In preparation for pouring, the mold is closed to within a few inches of being shut, over a perforated pipe gas burner and heated to 700° to 800° F. It is then opened wide, blown clear of soot, sprayed with mold coating, closed and clamped shut and about 100 lb of molten aluminum poured into it at approximately 1350° to 1400° F. Both clamps and mold movement are pneumatically operated.

Almost immediately upon solidification, the molders start pulling cores. As soon as this has been completed, the mold is opened wide, allowed to cool for an established period, then the casting is removed from the mold. This procedure permits production of five castings per hour. Figs. 2 to 6 illustrate the various steps in producing one of these castings.

Whenever the molding operation is stopped, the mold must be reheated, and in most cases must also be cleaned and repainted before resuming molding operation. Every foundry foreman has his own special recipe for mold paint, the secret of which he guards very carefully. The basic ingredients are sodium silicate, white or milk talc, thoroughly stirred in boiling water to a spraying consistency. In some cases, both white and milk talc are used and sometimes zirconium powder is added.

After the casting comes from the mold, it requires only to have the gates removed by a band saw and some light grinding of fins to be ready for the assembly line. The axle holes and the toe plate bolt holes are then bored and the truck is ready for delivery as soon as the wheels and toe plate are attached.

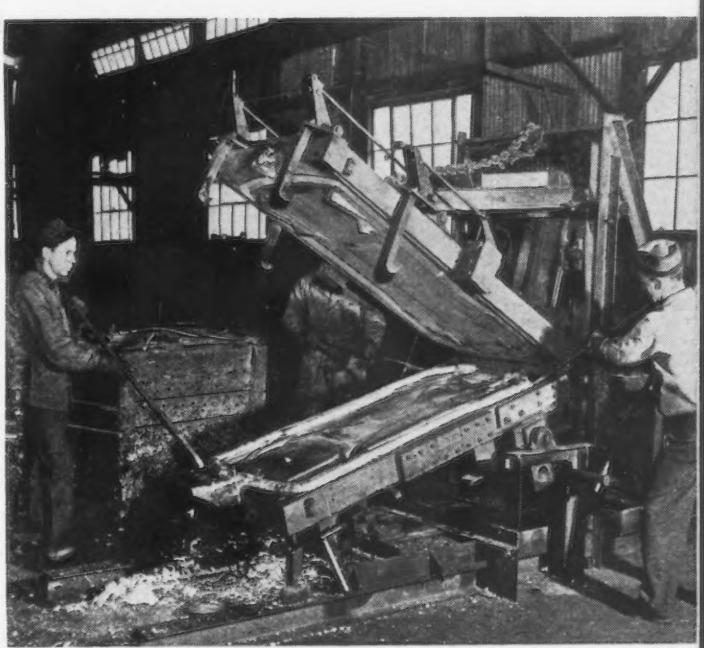

FIG. 5—After the casting has cooled sufficiently and the cores pulled, it is broken loose from the mold.

FIG. 4—Pouring the mold. Note that the mold has been tilted at an angle for pouring.

FIG. 6—Here the casting is shown being carried away from the mold.

How to Use Carbide Cutters for M

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o o o

THE surface foot rate at which steel, particularly heat-treated alloy steels, can be milled depends upon the Brinell hardness of the workpiece, as shown in table III in the third part of this series (Feb. 27, 1947). As the surface foot rate is lowered with the increasing hardness of the work, the K-factor, or horsepower per cu in. per min, also increases. These increases in the horsepower requirements to remove 1 cu in. of material per min are indicated in table V.

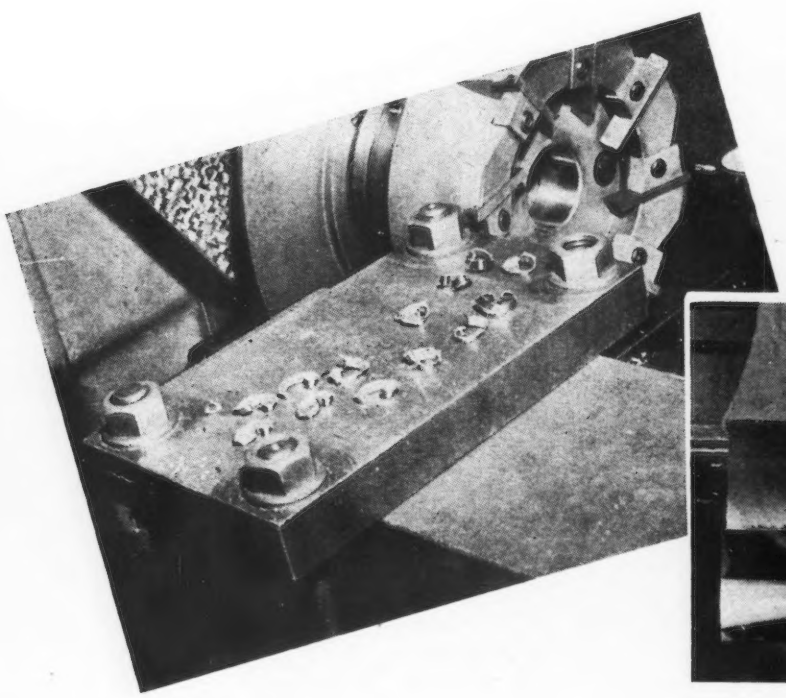
As is evident from an examination of the surface foot rate = Brinell number table III, the surface foot rate varies inversely as the hardness. This reduces the rate at which the material can be milled; that is, the rate at which the table is fed into the cutter must be reduced proportionately. This is a disadvantage when considering the general machinability of heat-treated materials with higher Brinell numbers. There are, however, some offsetting advantages, namely, better chip ejection and disposal, better finishes, and more workpiece rigidity for the same cross-sectional area. The disadvantages under the heading of machinability are: More horsepower required per cu in. per min, and less cutter life, or reduced number of pieces or cu in. removed between grinds.

Machinability is the resultant of a number of components, some of which are characteristics of the workpiece material, and the remainder are the cutter design, the machine, and the operating characteristics of the milling operation. The subject of machinability, though interesting, cannot be considered in detail in this presentation. It will suffice for present purposes, to refer to such obvious physical and metallurgical specifications as the tensile strength (and related hardness) and the effect of varying the amounts of such critical materials as carbon and sulfur.

As the Brinell hardness increases, the horsepower required to move a cu in. of material per min rises. This may be considered as a factor contributing to the decrease in the machinability. Decreasing the amount of carbon in the neighborhood of ten points increases machining difficulties. This sticky, stringy material has a lower machinability rate than a workpiece having 20 or more points of carbon. This is true in the sense that chips from low carbon steel components tend to adhere to the cutting edges and blades, and refuse to be disposed of quickly and efficiently. This difficulty is increased in the presence of sulfur as is evident in the difficulties encountered in the machining of substitute materials during the World War II period, an example of which is the X1020 steel.

By chip disposal is meant the ease with which chips are ejected from the cutter during its cutting action. The "figure 6" chips shown in fig. 25 are readily and easily disposed of by the cutter. Closely rolled chips increase the horsepower per cu in. per min, thus decreasing both the rate of metal removal and the total amount of material that can be disposed of in the form of chips with the power available.

The so-called K-factor is the customary designation of the horsepower required to remove 1 cu in. per min as effected in machining. This is an extremely valuable factor, the proper use and application of which becomes an effective tool in the hands of the metal removal technician. Obviously, the less power



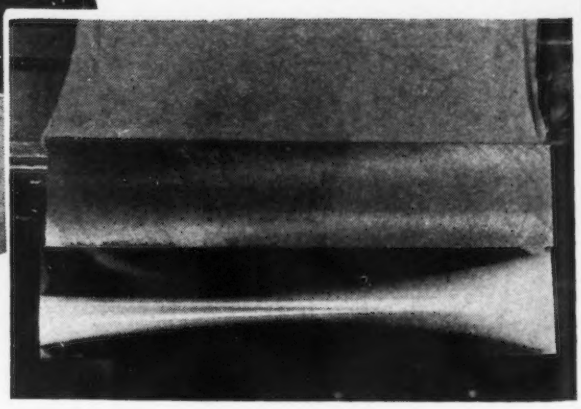
LEFT

FIG. 25—With high carbon steel and a properly designed cutter, chips will curl into a "figure 6" form and are easily ejected from the cutter during the cutting action.

o o o

BELOW

FIG. 26—Typical of the surface finish obtainable with carbide, this 15-microinch finish was obtained after a single milling pass with a chip load of 0.015 in.



Milling

. Heat-Treated Steels

. Chip Formation

. Cutter Life

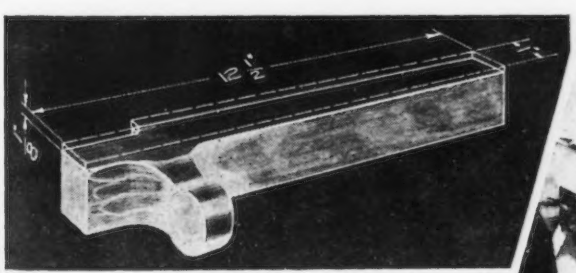
The various factors governing the choice of milling speeds and feeds for heat-treated steels are discussed herein, together with some consideration of chip formation, cutter life and surface finish. The necessity for insuring rigidity in both workpiece and cutter is stressed, and practical examples are quoted from actual shop experience.

required to move a cu in. of a workpiece per min, the greater the metal removal rate, and hence the greater the productive capacity from the available horsepower in the available machine tool. Thus, if the K-factor increases from 0.5 hp to 1 hp per cu in. per min, the rate at which metal can be removed using a 10 hp milling machine drops from 20 cu in. per min to 10. If the specifications called for the removal of a given amount of material, the K-factor increase of 100 pct just referred to would necessitate a corresponding increase in the capacity or number of machine tools.

Cutter design and cutting technique should be so directed as to keep the K-factor as low as possible. Assuming a suitable cutter and machine tool design and operation, the K-factor increases as the hardness of the workpiece increases. Sufficient data on the K-factor for various material hardness are available to justify presentation in tabular form in table V. If the hardness (Brinell number) is doubled, the K-factor is approximately doubled. Thus, an SAE 1020 steel having a Brinell hardness of 160 to 200 has a K-factor (using the proper cutting techniques) of 0.6. Interpreted, this means that 0.6 hp is required to move 1 cu in. of this SAE 1020, 160 to 200 Brinell material per min. If high carbon steel is heat treated to a Brinell hardness number of 320, the K-factor will increase to approximately 1.75.

The basic assumption in cutting or metal removal is of relatively greater hardness in the cutting material as compared to the workpiece material. The greater the difference, the smaller the effect upon the cutting material or blades, the less deterioration and breakdown, and consequently the greater the cutter life. On the other hand, as the gap between the hardness of the cutting material and the workpiece material is closed, the greater becomes the effect of the cutting action upon the tool, and hence, lower cutter life will characterize the cutting action.

Cutter life is influenced by so many factors that should be considered as adding to the machining difficulties. The dead soft steels such as those that contain from a few to ten points of carbon are difficult to machine, particularly to mill, because of difficulties of chip disposal. The chips stick and even actually



ABOVE

FIG. 27—Steel forging of 210 Bhn straight untreated carbon steel. The surface to be milled is shown by the dotted lines.

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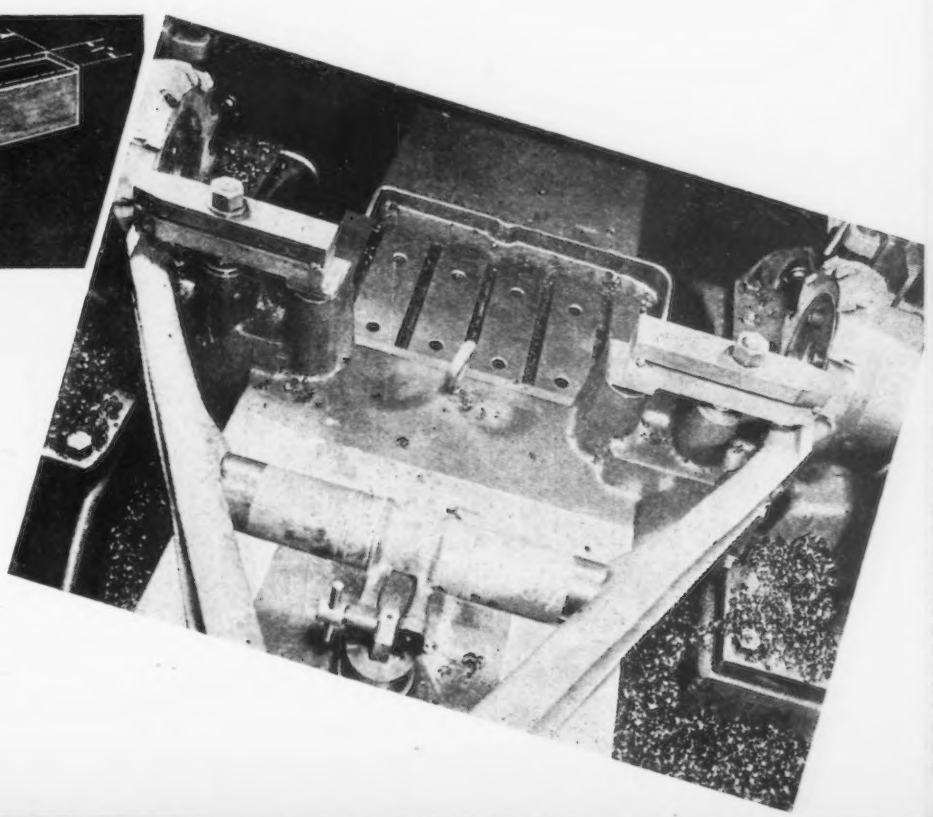


RIGHT

FIG. 28—General arrangement of the fixture used for milling the ends of an X-shaped airplane strut on a duplex mill.

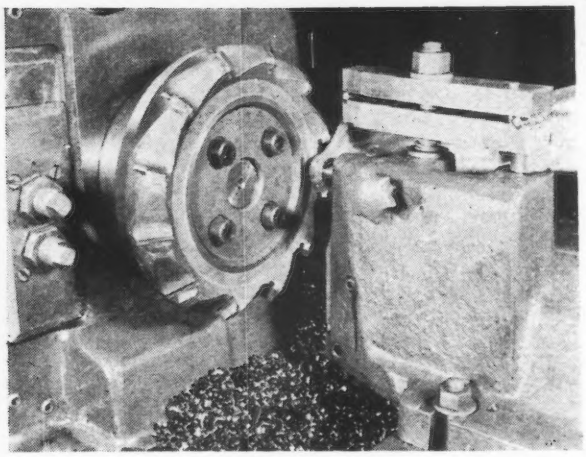


FIG. 29—Close-up of the cutter and clamping block showing the method of holding to eliminate vibration.

weld to the cutter body and blades. In its less disagreeable and disadvantageous form, there is a tendency to build-up when milling these materials. This, interpreted properly, means an adherence of the workpiece material to the cutting edge, first in a thin film or scale form and then increasing to the point where the cutting action is seriously interfered with.

Chips, on the other hand, formed from pieces of high Brinell or heat-treated steels, generally speaking, are easily formed in "figure 6's" that are easily disposed of. This characteristic naturally increases the machinability rate and thus is considered an advantage. The importance of chip formation and disposal can be judged by the fact that under certain conditions chips not properly disposed of remain in the chip clearance space in the cutter body and thus take a free ride. In the softer material, this results in the rapid formation of compact little balls that so weld themselves to the cutter body (due to the increased friction) that they are removed with considerable difficulty. Under these conditions, a relatively high powered milling machine is easily and quickly stalled although taking a light, low powered cut. Fortunately, chips from the heat-treated steels with the high Brinells are easily formed and are removed with the least amount of power loss and interference with the cutting action.

Finishes are frequently important as an engineering specification. Until the advent of carbide for milling, it was generally necessary to perform a final and subsequent grinding operation in order to obtain a finish in the neighborhood, for example, of 50 microinches. Such specifications, and even considerably better resultant surface conditions after milling, are now possible after a single pass. Fig. 26 indicates a 15 microinch finish after a single milling pass in which the chip load is 0.015 in.

Finishes are the resultant again of a number of components such as machine design and operation, cutter design and operation and lastly but important, the physical and other characteristics of the part to be machined. The Brinell hardness number of the component to be milled has a direct relationship to the resultant finish. Assuming good machining practice and a suitable machine tool and cutter, the surface condition of the milled workpiece is directly related to its hardness. The higher the Brinell hardness number, the better the finish. Conversely, the lower the Brinell hardness number, the poorer the finish. The harder materials cut clean, leaving a smooth surface whose microinch reading will be relatively low, whereas, the softer materials tear rather than cut. Type and condition of machine tool, cutter design and operation, cutting and clearance angles, nature and quality of tool grinds, rigidity in the machine and workpiece, and many other factors influence the very important consideration of cutter life. Here, it is justifiable only to consider briefly the effect of heat treatment of steels particularly the increase of Brinell hardness) on cutter life.

When considering the rigidity in the workpiece, as influenced by heat treatment, it will be found that if two components having equal cross-sectional area are milled, greater rigidity will characterize the one that has been heat treated so as to increase its tensile strength and corresponding Brinell hardness. Increasing the tensile strength raises the elastic limit and results generally in a decrease of vibration. This greater rigidity or decreased vibration of heat-treated steels tends to increase their machinability. This is true at least in the sense that cutter life will be increased, surface finishes will be better and less horsepower will be required to remove a given amount of material.

TABLE V

K-Factors for Milling Various Materials

Material	Aluminum			Bronze			Cast Iron			Meehanite			Malleable Iron	Steel						
																	Alloys			
	Soft		High Silicon Alloys	Soft	Medium	Hard	Soft	Medium	Hard	Soft	Medium	Hard		SAE 1112	SAE 1020 to 1335	SAE 1045 as cast or forged	Up to 200 Bhn	200 to 250 Bhn	250 to 300 Bhn	300 to 360 Bhn
K*	0.1	0.2		0.3	0.4	0.5	0.3	0.4	0.5	0.35	0.45	0.55	0.5	0.6	0.6	0.6	0.7	0.8	1.5	1.75

* Factor.

Practical Applications

The remainder of this article will be devoted entirely to a consideration of the problems involved in milling heat-treated steels and components. The nature and variety are such that this review will make available a range of information that can be applied to the successful milling of similar components.

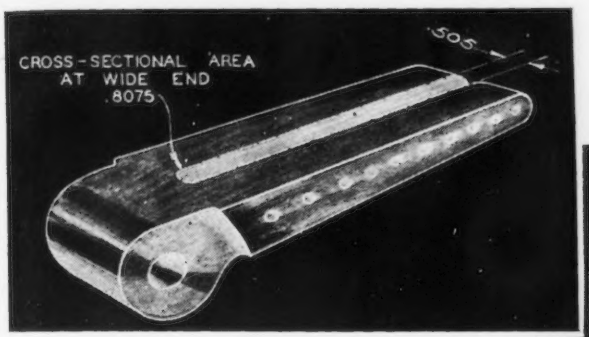
Fig. 27 shows a rack segment and indicates the surface to be milled and the amount of metal specified for removal. This component is a steel forging hardness of approximately 210 Bhn. This provides an opportunity to discuss the machinability of a steel forging with a Brinell hardness somewhat higher than is usually encountered in straight untreated carbon steels.

The machine selected for this operation is a No. 3 vertical milling machine with a 10 hp motor. This machine is entirely standard without unusual engineering specifications to make it specifically suited or adapted to carbide milling. Reference to table III, indicates that for the Brinell hardness specified, namely, 210 Bhn, a 3-in. cutter should be operated at approximately 650 rpm. Hence, the speed dial is set accordingly. A 3-in. diam four-bladed cutter is used for this operation with the cutting angles as follows:

7° negative radial rake, 7° negative axial rake and 15° corner angle.

The feed rate is set on the basis of a chip load of 0.010 in. which represents good carbide milling practice. The feed rate corresponding to this chip load at 650 rpm is 26 ipm. Under these conditions of operation, the spindle horsepower input is 1.95. This corresponds to a K-factor of 0.6.

The total number of passes between grinds is 150. While this cutter life is satisfactory, it is considerably reduced owing to the interrupted nature of the milling cut. The workpiece face is 1-in. wide and therefore only one blade is in contact at any given instant. Such an interrupted cut without benefit of a flywheel results in an alternate taking up and relieving of the backlash in the gear train, but while the effect on the blades under these conditions is noticeable as regards to cutter life, it is still an entirely satisfactory operation. The addition of a flywheel to the spindle of this standard milling machine would have resulted in a smoother flow of power to the cutter and hence longer cutter life. Milling machines, specially engineered for carbide milling, are now available with built-in flywheels.



ABOVE

FIG. 30—Application of carbide cutters made possible the milling of the slot in this hinge to limits of ± 0.0005 in. for width and parallelism.

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RIGHT

FIG 31—Setup for milling hinge showing the flywheel used for improved cutter life, auxiliary arbor supports, and hydraulic fixture clamps for fast, positive location.

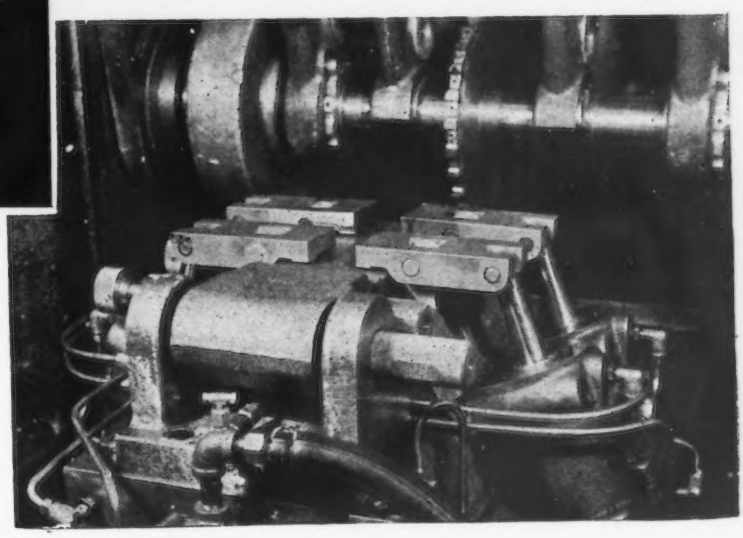
It is noteworthy that the surface condition, by a profilometer reading, is 30 to 40 microinches. This represents a decided improvement over high-speed steel operations. In addition, this, as all other carbide milling jobs, is performed dry.

A large X-shaped airplane strut furnishes another interesting example. One end of this is shown set up in fig. 28, which also indicates the nature of the holding fixture. The material is NE 8739 steel heat treated to 360 to 400 Bhn, and it is required to mill four pads 3.5x4.5 in., with a depth of cut of 0.15 in. As the illustration indicates, a special duplex bed-type milling machine having a 15 hp motor driving two spindles was selected for this job.

Since this weldment is composed of material of light cross-section, it is essential that the holding device perform, among other things, the essential task of preventing undue vibration in the workpiece. Fig. 29 shows a close-up of one of the clamping points, the adequacy of which is indicated by the success achieved in the operation.

In this case a surface foot rate of 552 was selected although table III points to a considerably lower rate. This higher rate was selected in order to reduce the chip load and hence, the tendency to vibrate which otherwise would be set up in a workpiece of this construction. The 13-in. table feed rate was selected to effect a desired production schedule; this results in a chip load of 0.0041 in. The 8-in. diam cutter, having 12 teeth, has cutting angles of 15° negative radial rake and 0° axial rake. The corner angle is 15°.

The spindle horsepower input is 8.5. Since the cut is 0.150x3.5x13 in., the cu in. per min rate of metal removed is 6.8 per pass per spindle. Since the spindle horsepower input is 8.5, the K-factor or horsepower required to remove a cu in. of metal per min is 1.2. This is typical of operations where increased power is required with increasing workpiece hardness.



It is also significant that the tolerances here call for ±0.0005 in. This is possible only with carbide, including the 20 to 30 microinch finish. This latter is achieved in spite of the inherent weakness of the component, particularly with regard to its tendency to vibrate.

Another interesting operation is that shown in fig. 30. This SAE 4340 forging is approximately 1¾ in. thick at the eye end and ¾ in. thick at the thin end. In addition, at the time the slot is milled, the holes, shown in the illustration, have been drilled. The interrupted nature of this milling operation adds to the difficulties involved in slot milling in material that has been hardened to 402 Bhn. The tolerance is ±0.0005-in. for both the width of the slot and the parallelism.

Fig. 31 shows the workpiece set in the hydraulically operated fixture with the four clamps holding it rigidly and with location assured by means of a pin passing through the hole in the eye end. The mounting of the cutter on the arbor is clearly indicated, and it will be noticed that two additional arbor supports are employed. The bottom half of each of these supports has been removed to provide the necessary clearance, but since the operation is performed by climb milling, the pressures are in an upward direction and the lower half bearing is unnecessary. The supports themselves, however, are extremely necessary to pre-

vent bending of the arbor under the cutting pressure. A substantial flywheel, shown just to the left of the inboard arbor support, is mounted on the arbor to improve cutter performance.

An 8-in. diam cutter is used for this operation. The cutting angles are 15° negative radial rake and 0° axial rake. The OD clearance angle is 2°, the side clearance angle 1°. The cutter is designed with solid carbide blades held in position by means of wedges and radially set Allen screws. As large a hub as possible is designed into the cutter body to provide additional stiffening; this is essential, since the thickness of the body is only 0.49 in.

Previous articles in this series covering carbide milling were as follows:

Part No.	Subject	Issue Date
1	Fundamentals of Carbide Milling	Feb. 13, 1947
2	Low Carbon Steel and Wrought Iron	Feb. 20, 1947
3	Straight Carbon and Cast Steel	Feb. 27, 1947

It is interesting to note that conversion of this job to carbide milling made possible an increase in the feed rate from ½ ipm with high-speed steel to 12 ipm. The chip load is 0.004 in., and the surface foot rate 552 which, with an 8-in. cutter, calls for a speed of 264 rpm. This relatively high rate (the hardness being 402 Bhn) is necessary in order to reduce the chip load to 0.004 in. and at the same time maintain a feed rate based upon a prescribed production schedule.

The floor to floor handling time with high-speed steel is 55 min; with carbide 1 min. Over and above this, however, the finish of 20 microinches reduces the scrap percentage for this specification to 0. With high-speed steel cutters, it was practically impossible to obtain the specified finish so essential in aircraft components. Finally, with high-speed steel cutters operating at ½ ipm, the heat produced in the workpiece bell-mouthed the slot, resulting in a high percentage of rejections. With carbide cutters operating at 13 ipm and much of the heat of work appearing in the chip rather than in the workpiece, the distortion is reduced to a minimum. The ability to hold this slot to ±0.0005 in. for slot parallelism is truely remarkable.

While the machinability as regard to cutter life is reduced owing to the high Brinell hardness, the surface finishes are exceptionally good for this very reason. It is significant, however, that an average of 50 slots are milled between grinds whereas for high-speed steel the average is 11.2 between grinds. This important and necessary improvement due to the conversion to carbide results in far less machine down time per unit component milled.

Part 5 of this series on carbide milling will appear in the next issue.—Ed.

Seamless Molybdenum Tubing

DEVELOPMENT for the first time of seamless molybdenum tubing in commercial quantities has recently been announced by Callite Tungsten Corp., Union City, N. J. The molybdenum tubing is said to be readily machinable, easily worked and shaped, and can be welded to iron, nickel and similar materials. It will not react with hydrofluoric acid and hot aqueous solutions of sodium and potassium hydroxide, and is only slightly affected by nitrogen.

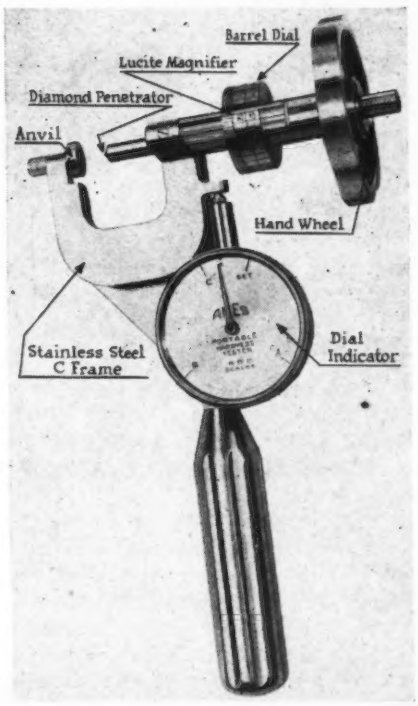
Some of the properties claimed for the product are: Purity—99.9 pct pure Mo; specific gravity—10.2; melting point—4750°F; tensile strength—from 180,000 to 250,000 psi, depending upon diameter; hardness—160 to 185 Bhn; thermal expansion (25° to 500°C)—4.7 to 5.7 x 10^{-6} per °C; thermal conductivity—1.46 watts per cm per °C at 20°C.

Molybdenum seamless tubing is said to be available immediately on a production basis in sizes ranging from 0.040 to 0.500 in. OD and in lengths up to 9 in., although other diameters may be had on special order. Applications for this development are anticipated in the field of electrical and electronic manufacture.

Portable Hardness Tester

A NEW instrument—a portable hardness tester—has been developed by the Ames Precision Machine Works, Waltham, Mass. The Ames portable hardness tester, as shown in the accompanying illustration, measures depths of penetration in materials to determine the degree of hardness. A diamond point penetrator is used in testing hard materials in the Rockwell C scale, and a ball point penetrator for testing relatively soft materials in the B scale. By use of a conversion chart, these readings can be readily converted to the Brinell scale. The instrument weighs less than 2 lb and can be used on rounds and flats up to 1 in.

Screw action rather than weights and levers is employed in this instrument. Pressure is easily applied in kilogram loads to force the penetrators into the material. These pressures also cause the C-frame to spring, thereby moving the indicator pointer to graduations on the dial. The graduations on the barrel dial denote the hardness in both Rockwell B and C scales. Round and V anvils are interchangeable.



10,000 Trade Names

—W—

(Continued)

Weld-A-Cast: Oxy-acetylene fluxes for brazing and welding of steel and nonferrous metals. Cortland Welding Compound Co., Cortland, N. Y.

Weldanka: Weldable 18-8 austenitic stainless for turbines, chemical and aircraft, paper and pulp applications. Brown, Bayley's Ltd., Sheffield, England.

Weld-Bilt: Portable elevators, hydraulic lift trucks, tiering machines. West Bend Equipment Corp., 229 Water St., West Bend, Wis.

Weldco: Tubing, fittings, roll covers, processing equipment, pickling equipment, reaction kettles, etc. Youngstown Welding & Engineering Co., 3760 Oakwood Ave., Youngstown 9.

Weldco Covers: Method of applying alloy metal coverings on rolls for paper mills, textile, glass, chemical, food, etc., industries; pressure welding and shrinking to insure tight, non-slip and corrosion-resistant roll coverings. Youngstown Welding & Engineering Co., 3700 Oakwood Ave., Youngstown 9.

Weld-Fast: Welding rod for bronze. Revere Copper & Brass Co., 230 Park Ave., New York.

Weldisk: Grinding disks, primarily for high-speed pneumatic grinders. Abrasive Products, Inc., South Braintree 85, Mass.

Weldit: Gas welding torches and blowpipes. Weldit, Inc., 992 Oakman Blvd., Detroit 6.

Weldit: Oxyacetylene cutting and welding torches, gas-air blowpipes, gas savers and automatic torches. Weldit Acetylene Co., Detroit 26.

Weld Mask: Welding spatter preventive. Turco Products, Inc., Los Angeles 54.

Weldomatic: Welding machines. Westinghouse Electric Corp., East Pittsburgh, Pa.

Weld-O-Trol: Circuit interrupters for welding machines. Westinghouse Electric Corp., East Pittsburgh, Pa.

Weld-O-Tron: Dc precision, low-current arc welder. Allis-Chalmers Mfg. Co., Milwaukee 1.

Weldpower: Stored-energy electric welders for light-gage metals; power and control units for resistance welding machines. Raytheon Mfg. Co., Waltham, Mass.

Weldrawn: Welded, stainless tubing. Superior Tubing Co., Norristown, Pa.

Weldrock: An edge-laminated rock maple hammer board, bonded with a heat-resistant adhesive. Irwin Mfg. Co., Inc., Garland, Pa.

Weldwood: Phenol-formaldehyde and urea formaldehyde resin-bonded plywood; thermosetting, in waterproof and water-resistant grades, also available in molded shapes, tubular and curved. United States Plywood Corp., 55 W. 44th St., New York.

Wellbronco: Brass and bronze alloys. Wellman Bronze & Aluminum Co., 2527 E. 93rd St., Cleveland.

Wellcast: Aluminum alloys with Cu, Zn, Si for light-alloy castings. Wellman Bronze & Aluminum Co., 2527 E. 93rd St., Cleveland.

Wellsville Savage: Second quality dry-press firebrick. Chicago Fire Brick Co., 1467 Elston Ave., Chicago 22.

Wel-Met: Sintered iron furnished in rough bars, billets, plate, powder metal and finished parts; for self-lubricating bearings and machine parts. Wel-Met Co., Kent, Ohio.

Wemcalloy: Metal alloy castings. Westinghouse Electric Corp., East Pittsburgh, Pa.

Wendt-Sonis Standard Carbide Tools: Specially designed cutting tools both carbide tipped and solid carbide. Wendt-Sonis Co., Hannibal, Mo.

West: Series of medium-carbon low-alloy steels for machinery, heat resisting and electrical magnetic parts. West Steel Casting Co., 807 E. 70th St., Cleveland.

West Cumloy: Tough Mn-Mo-V-Si alloy steel for shafts, gears, machinery parts. West Steel Casting Co., 807 E. 70th St., Cleveland

Westeeco: 58 Ni, 16 Cr-iron alloy for heat-resistant castings. Western Crucible Steel Casting Co., Minneapolis.

Western: Full line of brass, phosphor bronze, nickel silver, copper and special alloy strip, sheet, bars, shapes, etc. Western Brass Mills, East Alton, Ill.

Western: Transmissions, gears and machine-tool devices. Western Mfg. Co., 3428 Scotten Ave., Detroit 10.

Western Bronze: Brass with 2.3 Fe which resists grain growth and is used in refrigeration evaporators. Western Cartridge Co., East Alton, Ill.

Westex: X-ray apparatus. Westinghouse Electric Corp., East Pittsburgh, Pa.

West Felt: Felt material, in cut shapes for vibration, dampening, deadening sound, insulating against heat and cold and filtering liquid air and gases. Western Felt Works, 4117 Ogden St., Chicago.

Wetkrome Cement: Wet high-temperature bonding mortar (chrome ore base) for laying refractory brick. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Wetordry: Waterproof coated abrasives, with either aluminum oxide or silicon carbide mineral, for precision grinding and finishing and for the hand sanding of surfacers and undercoats. Minnesota Mining & Mfg. Co., 900 Fauquier Ave., Saint Paul 6.

Wetwal: For painting walls and ceilings; washable and will not discolor. Stonhard Co., 401 N. Broad St., Philadelphia 8.

Wexite: X-ray apparatus. Westinghouse Electric Corp., East Pittsburgh, Pa.

Wheelabrator: Sand and metallic blast equipment, core rod straighteners, shearing and gagger forming machines, taper strip flasks, sand cutters, pouring jackets, metal washing, rinsing and drying equipment. American Foundry Equipment Co., Inc., 451 S. Byrkit St., Mishawaka, Ind.

Wheelapeening: Shot peening process for improving the fatigue life of metal parts by blasting with steel shot thrown from an Airless Wheelabrator. American Foundry Equipment Co., Mishawaka, Ind.

Whelco: Corrosion-resistant 20 Cr stainless for chemical industry service. Wheelock, Lovejoy & Co., Cambridge, Mass.

Whipcord: Belting, hose. Manhattan Rubber Div., 61 Willett St., Passaic, N. J.

Whirlwind: Wire wheel brushes in various diameters, wire gages and thicknesses. Black & Decker Mfg. Co., Towson 4, Md.

White Rose: High-quality industrial lubricating oils. National Refining Co., Hanna Bldg., Cleveland 15.

White Tip: See Yellow Tip.

Whiz: Rust preventing compounds for castings, newly machined parts, etc.; spray, dip or brush on. R. M. Hollingshead Corp., 840 Cooper St., Camden, N. J.

Wickman-Neven: Steel-bonded diamond abrasive wheels used in grinding of carbide tools and in the glass industry. Wickman Corp., 15533 Woodrow Wilson Ave., Detroit 3.

Wickwire: Wire rope of all grades and constructions. Wickwire Spencer Steel Div., 500 Fifth Ave., New York 18.

Widia: Tungsten-cobalt sintered alloys for tools and dies, cutters, shapers and drills. Thos. Prosser & Son, 120 Wall St., New York: (agent), Fried. Krupp, A. G., Essen, Germany.

Wilco: Series of electrical alloys including 33-67 rhenium and osmium; for voltage regulators, circuit breakers, instruments. H. A. Wilson Co., 103 Chestnut St., Newark, N. J.

Wilco Silver Solder: Series of silver solders containing from 22-49.5 Ag, 34.5-44 Cu, and 16-34 Zn. H. A. Wilson Co., 107 Chestnut St., Newark, N. J.

Williard: Lathes. Porter-McLeod Machine Tool Co., Hatfield, Mass.

Willison: Railway car couplers. National Malleable & Steel Castings Co., Cleveland 6.

Wilmington Fibre: Cotton and paper, chemically treated, nonplastic material, in sheet form or tubes for machining or stamping into electrical and mechanical insulation. Wilmington Fibre Specialty Co., Wilmington, Del.

Wilrich: Corrosion resisting Ni-Cr-Cu and Cr-W hard facing electrodes. Wilcox Rich Div., Eaton Mfg. Co., 9771 French Rd., Detroit.

Wilson: Electric arc-welding machines. Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York 17.

Wilson: Glasses, goggles, welding masks, respirators, etc. Willson Products, Inc., Reading, Pa.

Wilson: Iron alloy for armor plate and welding rod. Wilson Welder and Metals Co., 60 E. 42nd St., New York.

Wilson: See Feather Spec.

Winter King: Kerosene-burning heater for keeping railroad switches free from ice and snow. Bethlehem Steel Co., Bethlehem.

Wireduct: Non-metallic flexible conduit. Wiremold Co., Hartford 10.

Wiremold: Surface metal raceways and fittings for wiring for light, power, or telephone. Wiremold Co., Hartford 10.

Wiscolay: Preformed wire rope. Wickwire Spencer Steel Div., 500 Fifth Ave., New York 18.

Wissco: Series of stainless steels for wires, weld rods and springs in high-temperature service. Wickwire Spencer Steel Co., 500 Fifth Ave., New York.

Witch Dip: Paraffin-base wax finish cut with solvent and maintained at 120°F to produce corrosion-resistant wax final finish; also acts as lubricant. Mitchell-Bradford Chemical Co., 2446 Main St., Bridgeport, Conn.

Witch Oil: Water-displacing, rust-inhibiting oil used, uncut, at room temperature as bond for paint or enamel (not lacquer); rust-proofing for parts in storage. Mitchell-Bradford Chemical Co., 2446 Main St., Bridgeport, Conn.

Wizard: Quick-change chucks for handling drills, reamers, etc., in drill presses and turret lathes. McCrosky Tool Corp., Meadville, Pa.

Wofram C. S.: A 3.5 W alloy crucible steel for special roll turning tools, boring cylinders, expanding tubes. Thos. Firth & John Brown, Ltd., Sheffield, England.

Wolff Clutch: Safety device to eliminate damage to automatic machinery from overloading. Polaroid Corp., Cambridge 39, Mass.

Wolverine: Mechanical ball bearing mounted grinding wheel dresser, serrated cutters. Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.

Wolverine Spun End: Method of forming tube which combines reducing, necking, closing, fabricating, wall thickening, etc. Wolverine Tube Div., 1411 Central Ave., Detroit 9.

Wompco: High-silicon cast iron for cylinders, gears. Worthington Pump & Machinery Corp., Harrison, N. J.

W. O. No. 1: Phosphatizer in preparing aircraft metals for painting. Turco Products Inc., Los Angeles 54.

Woodex: Impregnated rock maple furnished in parts which can be machined; for bearing surfaces in textile, road building, agricultural, tobacco and many other types Machinery. Neveroil Bearing Co., Wakefield, Mass.

Wood Floor Preservative: For preserving life of new and used wood floors; prevents splintering and disintegration. Stonhard Co., 401 N. Broad St., Philadelphia 8.

Woodite: Molded wood, thermoplastic, furnished as molded parts; for nameplates or decorative parts. Syracuse Ornamental Co. Inc., Syracuse, N. Y.

Woolford: Wood tanks especially constructed and lined for steel and wire cleansing. Woolford Tank Co., Darby, Pa.

Woolsey: Metal finishes in all colors. C. A. Woolsey Paint & Color Co., Inc., 229 E. 42nd St., New York 17.

Worcester Wire: High and low-carbon steel wire in small diameter sizes. Worcester Wire Works, Div. of National Standard Co., Worcester, Mass.

Worksaver: Electric lift trucks. Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia 24.

Worthite: Complex alloy with 48 Fe, 24 Ni, 19 Cr, Mo-Si; for acid resistance in pumps and valves. Worthington Pump & Machinery Corp., Harrison, N. J.

Wotton: Motor-generator sets for motive power battery charging. Electric Products Co., Clarkstone Rd., Cleveland 12.

Wrap-Rax: Rack-coating material. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Wright Circuit: Dynamic lowering control system used on dc cranes, hoists, etc. Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4.

Wrinkle: Baking enamel in all colors, spray or dip on, for all metal articles. Interchemical Corp., Empire State Bldg., New York.

Wrinkle: One-coat finish for metal sheets, castings, weldments, fabrics, paper, etc. New Wrinkle, Inc., 1765 Springfield St., Dayton 8.

Wrinklecast: Hammered or wrinkled-finished enamel for metal specialties; all colors. Yarnall Paint Co., Grays Ave. West of 54th St., Philadelphia 43.

W. W. Co.: Fire brick. Robinson Clay Products Co., Akron 9, Ohio.

Wyckoff: Cold-finished steel, controlled carbon and alloy steels; turned, polished, ground and polished shafting. Wyckoff Steel Co., First National Bank Bldg., Pittsburgh.

Wynite: Thermoplastic, nontoxic resin; for electrical insulation and as a protective coating for wires of all types. National Plastic Products Co., Odenton, Md.

—X—

Xactline: Temperature control units and instruments. Claud S. Gordon Co., 3002 S. Wallace St., Chicago 16.

Xaloy: Alloy iron with small amounts of nickel and boron; for parts where high wear is encountered. Eaton Mfg. Co., 702 E. 140th St., Cleveland, Ohio.

Xantal: Copper alloys with Al-Fe-Mn or Ni for general applications, castings and forgings. Alluminio S. A., Milano 112, Italy.

X-B: Ni-Cr-Fe alloy for castings, furnace parts. General Alloys Co., 401 West First St., Boston.

X-Crepe: Process for imparting "all-directional stretch" to paper; for waterproof bags and linings, covers, wrappings for metal products, plastic laminated materials, simulated leather and fabrics. Cincinnati Industries, Inc., Cincinnati (Lockland).

X-Crepe Resin: Phenol formaldehyde, thermosetting plastic in rolls, sheeted, die cut and coiled; also preforms for compression molding and laminating; structural or functional parts where properties of phenolics are desirable. Cincinnati Industries, Inc., 515 Station Ave., Lockland, Cincinnati.

X Industrial Concentrate: Liquid soldering flux with powerful cleaning ability, for stainless steel, monel, copper alloys and other special materials (except aluminum). Industrial Service Labs., Milwaukee, Wis.

X-ite: Heat, corrosion and abrasion resistant, high Fe-Ni-Cr alloy with Mn-Si for furnace parts, skids, and roller rails. General Alloys Co., 405 First St., Boston.

XL Metal: Silicon-manganese cast iron for piston rings in marine steam engines. American Hammered Piston Ring Co., Bush & Plant Sts., Baltimore.

X Mayari Sucker Rods: Alloy-steel sucker rods for heavy pumping duty in corrosive oils. Bethlehem Steel Co., Bethlehem.

X-OL: Durable water-proof floor wax. Turco Products Inc., Los Angeles 54.

X-P: Expendable pallets adapted to fork-lift trucks. Techtmann Industries, 714 W. Wisconsin Ave., Milwaukee 1.

X-Trudo: Special grade of cold-heading wire for use in extrusion die work. Youngstown Sheet & Tube Co., Youngstown.

X-X Autocrat: Wear resisting, leaded, sand-cast bushing bronze. United American Metals Corp., 200 Diamond St., Brooklyn 22.

XX Nickel Shot: High-purity, used in production of ferrous and nonferrous alloys. International Nickel Co., Inc., 67 Wall St., New York 5.

Xzit: Chemically cleans soot and fire-scale deposits from heating surfaces, giving higher boiler temperatures, reduces maintenance, and eliminates sparking and stack fires. Xzit Sales Co., 1029 Clinton St., Hoboken, N. J.

—Y—

Y and W: Hand and pneumatic chisels, cutters, gages, punches, star drills. Young & Ward, Inc., Fan and Elm Sts., Hillsboro, Ohio.

Yale Kron: Industrial scales. Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia 24.

Yale Multiple: Stroke hand lift trucks. Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia 24.

Yarlite: Air-dry or baking enamels in all colors. Yarnall Paint Co., Grays Ave. West of 54th St., Philadelphia 43.

Yarmor: Pine oils for metal-cleaning compounds, paint and varnish solvents, etc. Hercules Powder Co., Wilmington, Del.

Yellow Jacket: Electric arc-welding machines. Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York 17.

Yellow Strand: Wire rope. Broderick & Bascom Rope Co., 4203 N. Union Blvd., St. Louis 15.

Yellow-Stripe: Aluminum-oxide belt, sheet and general-purpose abrasives. Clover Mfg. Co., Norwalk, Conn.

Yellow Tip: Series of hard-facing gas and arc alloys; for wear and high-temperature application. Coast Metals, Inc., 2 W. 45th St., New York 19.

Yoder: Roll forming and tube mill, coiling, slitting, embossing, welding and cutting-off machinery. Yoder Co., 5510 Walworth Ave., Cleveland 2.

Yolectro: Special grade of wire and rope wires. Youngstown Sheet & Tube Co., Youngstown.

Yoloy: Corrosion resistant 2 Ni, 1 Cu alloy steel for tubes, shapes, bars, wire. Youngstown Sheet & Tube Co., Youngstown.

Yoloy: Series of nickel-copper high-tensile corrosion-resistant steels ranging from deep-drawing grades with excellent weldability to higher strength and abrasion resistant steels. Youngstown Sheet & Tube Co., Youngstown.

Yorcalbro: Anti-corrosive Cu-Zn-Al alloy for condenser tubes. Yorkshire Copper Works, Ltd., Leeds, England.

Youngstown: All types of steel products. Youngstown Sheet & Tube Co., Youngstown.

Youngstown: Safety limit stop to prevent overhoisting on cranes. Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4.

— Z —

ZA Anodes: Zinc anodes, mercury free, containing aluminum. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Z. A. M.: Acid-resistant zinc alloy with a little Al and mercury; for anodes used in zinc plating. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Zamak: Series of diecasting zinc alloys with Al-Cu-Mg, for gears, motor frames, hardware, etc. New Jersey Zinc Co., 160 Front St., New York.

ZAM Anodes: Zinc anodes containing aluminum and mercury. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Zapon: Finishes for metal and non-metal products. Zapon Div., Atlas Powder Co., Stamford, Conn.

Zeal: Metal cleaner and polish. Turco Products Inc., Los Angeles 54.

Zenel: Alloy steel for tools. Bonney-Floyd Co., 613 Marion Road, Columbus, Ohio.

Zenite: Alloy cast iron. Zenith Foundry Co., 1501 S. 83rd St., West Allis, Wis.

Zeno: Alloy cast iron. Zenith Foundry Co., 1501 S. 83rd St., West Allis, Wis.

Zephyr: Hand lift trucks. Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia 24.

Zephyrcrane: Pneumatic-tires one-engine cranes. Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6.

Zerofil: Low-temperature insulation. Johns-Manville, 24 E. 40th St., New York 16.

Z-Guss: Magnesium alloy for general applications. Aluminiumwerke Maulbronn, Maulbronn, Germany.

• In order to assure the accuracy and completeness of this directory, manufacturers and suppliers serving the metalworking industry are requested to check the trade names appearing in this and succeeding issues and to advise THE IRON AGE of any omissions or errors. These changes will be incorporated in the first reprint made for general distribution. Communications should be addressed to THE IRON AGE, 100 E. 42nd St., New York 17. Attention Trade Name Directory.

ZHS: Magnetic contactors for 2300 and 4600-v motor control duty. Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4.

Zialite: Nickel plating solution designed to plate nickel directly onto zinc diecasting and other metals. Zialite Corp., 143 Exchange St., Worcester 8.

Zig-Zag: Power-driven conveyor equipment for degreasing, enameling, etc. Richards-Wilcox Mfg. Co., Aurora, Ill.

Zilloy: Zinc alloy with 1.0 Cu, 0.01 Mg, for corrugated roofing and siding. New Jersey Zinc Co., 160 Front St., New York.

Zimal: Corrosion-resistant zinc alloy with Al-Cu, for carburetors, gears. Birmingham Aluminum Casting Co., Birmingham, England.

Zincate: Process for applying a zinc coating on aluminum and aluminum alloys. Aluminum Co. of America, Pittsburgh; Reynolds Metals Co., Louisville.

Zinc Fluoborate: A high-speed acid zinc electroplating solution. General Chemical Co., 40 Rector St., New York 6.

Zincgrip: Sheet steel with a special zinc coating that does not peel or flake in severe forming and drawing operations. Also supplied in coils. American Rolling Mill, 303 Armco Ave., Middletown, Ohio.

Zinell: Plain-carbon steel for bearings. Bonny Tool & Forge Co., Allentown, Pa.

Zinnal: Aluminum sheet sandwiched between tin. Vereinigte Silberhammerwerke Hetzel, Nuremberg, Germany.

Zin-O-Lyte: Zinc-plating solutions, brighteners, and anodes. E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.

Zintex: Wire cloth. John A. Roebling's Sons Co., Trenton, N. J.

Zircite: Ceramic furnished in rods and tubes: for use where high chemical, heat and impact resistance are required. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.

Zircon: See Taylor Zircon.

Zircotube: Zirconium refractory base combustion tubes used in carbon and sulphur analysis. Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4.

Zirmet: 99 plus pct. ductile zirconium metal, in rough bars or billets, finished rods, bars, wire and sheet; for acid-resistant or alkali-resistant parts. Foote Mineral Co., Inc., Chelten Ave., Philadelphia.

Zivco: Tool steels. Ziv Steel & Wire Co., 2945 W. Harrison St., Chicago 12.

Z-Metal: Cast ferrous metal, alloyed and heat treated for greater yield strength, hardness, and corrosion resistance than malleable iron. Chain Belt Co., 1600 W. Bruce St., Milwaukee 4.

Z-Metal: Wear and corrosion-resistant malleable cast iron with Si-Mn, for gears, wrenches, pipe clamps. Acme Steel & Malleable Iron Works, 3902 Chandler St., Buffalo, N. Y.; Gunite Foundries Corp., Rockford Ill.; Industrial Furnace Corp., Buffalo 7.

Z Metal: Special malleable iron. Rockford North-West Malleable Iron Co., Peoples & Rutz Ave., Rockford, Ill.

Z Nickel: Extra strength and hardness, heat treatable, for corrosion-resistant springs, marine and automobile radio antennae, diaphragms and similar flexing parts; electrical current-carrying springs for heavy stresses; extrusion dies for plastics. International Nickel Co., 67 Wall Street, New York.

Zodiac: Nickel-silver, Ni-Cu-Zn alloy for shunts, rheostats, resistance wires. Henry Wiggin & Co., Ltd., Birmingham, England.

Zonax: Bright chromium plating equipment. W. Canning & Co., Ltd., Great Hampton St., Birmingham 18, England.

Zorite: Heat and corrosion-resisting high Fe-Ni-Cr alloy with Mn-Si; for furnaces, heaters, electrical resistances. Michiana Products Corp., Route 12, Michigan City, Ind.

Z-3 Alloy: Diecasting aluminum alloy with 7 Cu, Zn, Si, Fe for crank cases, gear boxes, rake shoes. Birmingham Aluminum Casting Co., Ltd., Birmingham, England.

Z-2: Zn alloy with 4 Al, 3 Cu for gears, pumps, motor frames, hardware. C. M. Grey Mfg. Co., 366 Central Ave., East Orange, N. J.

Zurco: Series of chromium stainless steels for heat and corrosion resistance. Zurbach Steel Co., Middlesex Ave., Cambridge, Mass.

Zurco Steel: Low carbon, deep-drawing steels for Ni-Cr plating, filing cabinets, lockers, furniture. Zurbach Steel Co., Cambridge, Mass.

Zyglo: Materials and equipment for location of physical discontinuities in solid materials by the fluorescent penetrant inspection method. Magnaflux Corp., 5900 Northwest Highway, Chicago 31.

Zyrox: Chlorine-containing resins and compounds. Bakelite Corp., 300 Madison Ave., New York 17.

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...Selection and Installation of

THE accuracy of any pyrometer system can be no better than the inherent precision of its components. Generally, the user will exercise the utmost care in the selection of an indicating or recording instrument with a high degree of accuracy or a precision thermocouple, but will frequently neglect the all-important factor of the wiring between the two. Even though proper consideration has been given to such factors as the ambient temperature gradient between the thermocouple and the indicating instrument, and the mechanical protection of the leadwires, the less common aspects of the electrical-mechanical installation and the insulation properties are often glossed over.

The temperature indication in pyrometry is obtained from the measurement of the emf developed by a thermocouple. This emf is determined by the temperature differential between the hot and cold junctions of the thermocouple. If the thermoelectric circuit were confined to the thermocouple proper, variations in the temperature at the cold junction (terminal head) would introduce an intolerable error. However, when suitable extension leadwire is used to extend the thermocouple to the instrument and thus locate the cold junction at a point where changes in its temperature can be easily and accurately compensated, the required degree of precision can be attained.

This article is an extended abstract of a paper prepared by C. C. Roberts and C. A. Vogelsang, Engineers, Brown Instrument Co., division of Minneapolis-Honeywell Regulator Co., Philadelphia.

When extension leadwires are used (as they are in practically all pyrometer installations today) they become a part of the thermoelectric circuit and the thermocouple actually consists of the extension leadwires plus the thermocouple itself. Hence, the thermoelectric characteristics of the metals used in the extension leadwires are as vital as those of the thermocouple proper.

The importance of providing protection for the thermocouple proper is appreciated by all experienced users of such devices. In like manner, the proper protection of the extension leadwire is of equal, if not greater, importance, since it is not generally an expendable part of the installation and frequently costs as much as, or more, than the thermocouples and instruments combined.

In all instances, choice, layout and installation of leadwires, are important and these factors become increasingly so as the numbers and lengths of the leadwires necessary to an installation become greater. In installations, such as brick yards, engine testing laboratories, steel mills, blast furnaces, and coke ovens, where extension leadwires are used under wide ambient temperature conditions and subject to many deleterious factors, such as weather, corrosive atmospheres and the like, the possibility of future maintenance difficulties and operational inaccuracies are multiplied.

Inasmuch as the emf generated by a thermocouple is, at the most, only about 50 mv (0.050 v), very minute leakage or galvanic action can produce serious inaccuracies in the temperature indications by chang-

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FIG. 1—Checking thermoelectric characteristics of extension leadwire. Samples of wires whose ends have been welded together can be seen protruding from the small furnaces, the temperature of which is kept at a known degree. The opposite ends of the sample are inserted into ice water.

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Thermocouple Extension Leadwires...

Use of improper leadwire or the possibility of improperly installed leadwires impairs both the accuracy of the temperature indication and the control of the process variable. Also, the effect of wide variations in ambient temperature becomes a serious detriment in obtaining accurate indications unless proper extension leadwire is used. This article outlines the various factors governing selection of the proper kind of leadwire and indicates a few simple rules to be followed in order to insure accurate measurement and control.

ing the emf applied to the instrument. Therefore, the moisture-resistant qualities of insulation, which guard against the possibilities of leakage or galvanic action, are primary factors to consider. The weather, heat, and corrosive atmosphere resistant qualities are of equal importance in forestalling leakage, direct shorts, and grounds.

Where process control is dependent upon the consistent operation of the thermocuple system, the importance of leadwires is multiplied because the product quality and production is in jeopardy if leadwire troubles should arise. As a general rule, in industrial processes, heat and dryness, no less than moisture, are potentially dangerous factors. Heat will dry some insulations so that they become brittle, highly absorbent, or actually destroyed. It must be borne in mind that leakages and similar effects, which would be inconsequential at higher voltages, such as 110 v, or even at one volt, produce serious errors in the minute voltages common to thermocouple circuits.

Technical Considerations

For the purpose of clarity, the technical aspects of extension leadwires will be divided into two general parts; (1) wire, and (2) insulation. The considerations for each in relation to a specific installation are entirely independent of one another. Therefore, by fulfilling the requirements as to the type of wire and the type of insulation, the proper extension leads for the specific case at hand can be ascertained.

As previously stated, the emf developed by a thermocouple is determined by the temperature differential between the hot and cold junctions of the thermocouple. Since the extension leadwires are intended to extend the cold junction point to the end of the extension leadwires, they must have thermoelectric characteristics which conform to those of the actual thermocouple wires. Otherwise, at the junctures between the actual thermocouple wires and the extension leads, there would be a thermoelectric effect which would result in erroneous readings.

Wire Conductors

While in most cases the same metals are used in the extension leadwires as are used for the thermocouple wires themselves, there are times when this is economically impractical. However, if the thermoelectric characteristics of the extension leadwires and those of the thermocouple itself conform, the same results are obtained, regardless of the materials used. For example, it is economically prohibitive and unnecessary to use platinum-platinum rhodium extension leadwires with a platinum-platinum rhodium (QR or HER) thermocouple. Consequently, a cheaper combination of metals (such as copper-copper nickel) whose thermoelectric characteristics conform within the required limits, is used to obtain entirely satisfactory results.

Insofar as the size or gage of wire is concerned, there is only one factor of relative importance to be considered, and that is the effect of external resistance upon the indicating instrument. Where the calibrated galvanometer (millivoltmeter) type of instrument is used, the resistance of the external leads should be as low as practical, especially where multiple measurements are made from thermocouples located at greatly varying distances from the instrument. Usually No. 14 B & S gage wire is used. Where the galvanometer actuated potentiometer type of instrument is used, somewhat smaller wire can generally be used since the degree of accuracy is not dependent upon the external resistance in the circuit. As a rule, No. 16 B & S gage wire is used. Where an instrument, such as the Brown ElectroniK, is used, external resistance has negligible effect upon its operative characteristics and extension leads as small or smaller than No. 20 B & S gage can be used.

For the majority of installations, solid conductor wire is used; however, where the thermocouple is moved from one application to another, necessitating flexible extension leadwires, the stranded type of conductor must be used in order to avoid frequent breakage.

The insulation surrounding the extension leadwire conductors must act not only as a dielectric (have high electrical resistance) between the two conductors and between the two conductors and ground, but must also act as a protective covering to exclude the entrance or absorption of any deleterious materials which would give an unfavorable electrical reaction.

Primarily, the insulation must be a good dielectric. It is of the utmost importance that the dielectric strength (insulating qualities) remain effective throughout any conditions of temperature, humidity, corrosive atmosphere, etc., to which the leadwires may be subjected. For this reason, various kinds of

material are used for insulation, the choice of which is determined by the condition prevalent at some particular installation. For example, it is often necessary for the extension leadwire insulation to withstand weathering in such open air installations as brick or coke ovens. In such cases, the insulation must be able to withstand both excessive wetting and excessive baking by the sun without any serious deterioration in the dielectric strength of the insulation. In installations where the leadwire is not subject to weather deterioration, other detrimental conditions, such as steam, flame, corrosive atmosphere, and heat must be considered insofar as the insulation is concerned, and an insulation capable of withstanding these conditions selected.

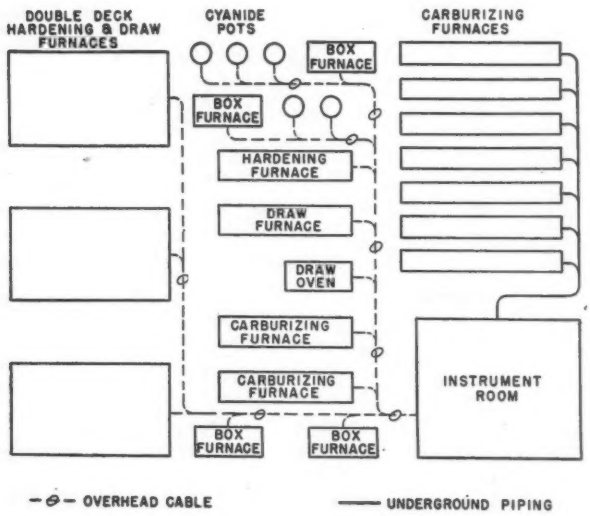


FIG. 2—Layout of the extension leadwire wiring at the Gear and Axle Dept., Ford Motor Co., River Rouge Plant. As can be seen from the illustration, part of the wiring is underground and part overhead. The underground wiring is protected by lead conduit. The hardening and carburizing furnaces use No. 14 gauge copper-constantan asbestos covered leadwires and chromel-alumel thermocouples. The draw furnaces use No. 14 gage iron-constantan asbestos covered leadwires and iron-constantan thermocouples. The longest leadwire is approximately 300 ft long.

Types of Extension Leadwires

The extension leadwire supplied by Brown is available both in different kinds of insulation and in different metal conductors. In this way, extension leadwire with thermoelectric properties to conform to any thermocouple and with insulation to fit any installation condition is available. The following list of the most commonly used thermocouples shows the kinds and sizes of the extension leadwire which are supplied:

Iron-constantan (IC) thermocouples—14-gage solid conductors, 16-gage solid or stranded conductors consisting of a positive conductor of iron and a negative conductor of constantan.

Chromel-alumel (MA) thermocouples—15 gage solid conductor, 16-gage solid or stranded conductors consisting of a positive conductor of copper and a negative conductor of constantan. Also, 14-gage solid conductors consisting of a positive conductor of chromel and a negative conductor of alumel. Because of the cost of chromel-alumel leadwire, copper-constantan leadwire, which is less expensive, is used for installations involving thermocouple terminal head temperature up to about 250°F. Above this temperature, the relationship between the temperature and the developed emf for copper-constantan becomes increasingly different from that of chromel-alumel, thus making it necessary to use the more costly chromel-alumel combination to avoid serious errors in the temperature indications.

Platinum-platinum rhodium (QR or HER) thermocouples—16 gage solid or stranded conductors consisting of a positive conductor of copper and a negative conductor made of a special alloy (leadwires of the special alloy and copper were developed to be equivalent in their thermoelectric characteristics with platinum-platinum rhodium since platinum is a noble metal and consequently quite costly).

Copper-constantan (CC) thermocouples — 20-gage conductors consisting of a positive conductor of copper and a negative conductor of constantan.

The foregoing list of conductors is available with different kinds of insulation, so that specific installation conditions can be met. Not all conductors are available in all types of insulation, inasmuch as industrial requirements are such that each particular type of thermocouple will not be used subject to all conditions of exposure. The following list shows the types of insulations available, together with the general conditions under which they should be used:

Polyvinyl thermoplastic — general purpose insulation for use in temperature conditions under 140°F. This insulation is greatly resistant to deterioration and moisture.

Felted, wax-impregnated, asbestos—high temperature, flame and moisture-resistant insulation. Used generally where the temperature ranges from 140° to 400°F. The asbestos, impregnated with a flame and moisture-proof wax, forms an insulation suitable for installations wherein flames, steam, and high temperatures are encountered. It also has considerable resistance to moisture.

Rubber — flexible, moisture-resistant insulation. Generally used where flexibility is the paramount factor, such as for portable use, and where the temperature does not exceed 110°F.

Leadwire Installation

Proper installation of extension leadwires is of no less importance than the wire itself in the attainment of accurate pyrometer readings over long periods of service. Many failures and inaccuracies in pyrometer systems have been the result of poor electrical connections and grounded wiring.

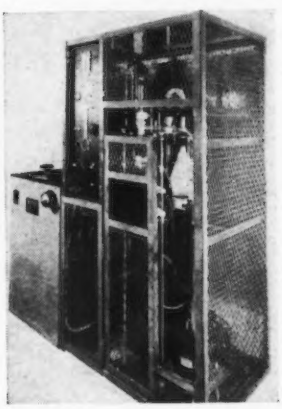
There are but a few rules to be followed in making a proper installation. Whenever possible, the leadwires should be run in conduit to protect them against the possibility of mechanical injury. All necessary splices must be soldered, wrapped first with rubber tape, and then with friction tape. It is extremely important that the polarity markings throughout the wiring between the thermocouple and the indicating instrument be followed and that they be connected in the proper polarity at all terminals. For example: The red negative lead, common to most extension leadwires, must first be connected to the negative terminal on the thermocouple; the red colored conductor must then be spliced only to a red colored conductor throughout the wiring to the instrument at which point it must be connected to the negative terminal of the indicating instrument. The observance of these simple rules for the wiring of the pyrometer system not only assures accurate results, but dependable service.

New Equipment . . .

Testing and Measuring Instruments

Newest developments in testing and measuring instruments described in these pages include oxygen analyzers, gaging instruments for measuring material thickness, fatigue strength, enamel insulating value and magnetic fields. Tachometers, vibrometers, electronic timers and counters, rectifiers, ammeters and voltmeters are other instruments discussed herein.

[1] Analysis of the oxygen content of openhearth melts is said to be accomplished in less than 10 min with Cenco-Derge oxygen determination apparatus which makes possible improved quality and greater ingot yields by permitting a remarkably accurate oxygen determination while the heat is still in the finishing period. The apparatus is manufactured by the *Central Scientific Co.*, 1700 Irving Park Rd., Chicago 13. In the procedure, a sample is poured into a specially designed mold. A piece of this sample is weighed and introduced through a mercury vacuum lock into an induction furnace operating



under vacuum. At a temperature of 2800 to 3000°F, the sample melts in 20 sec and all oxides are reduced by the carbon present in the graphite furnace crucible. Resulting carbon monoxide is then accurately measured, and the percent oxygen is computed from a simple equation.

Oxygen Indicator

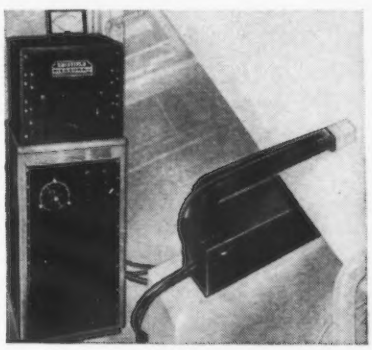
[2] For measuring the oxygen content of gaseous mixtures in chemical, metallurgical, petroleum, and allied industries, and for combustion and process control in gas transmission and distribution, an oxygen indicator, Type C, has been made by *Mine Safety Appliances Co.*, Braddock, Thomas, and Meade Sts., Pittsburgh 8. The most important single element of the indicator is its electrolytic detector cell which is made up of a plastic container with a hollow carbon tube and metallic plate serving as electrodes in approximately an ounce of liquid electrolyte. Polarization in the cell causes hydrogen to be deposited on the carbon pole. When a gas sample containing oxygen is passed through the hollow carbon electrode, diffusion through the porous carbon causes the oxygen to combine with the electrolytic hydrogen reducing the internal resistance of the cell and causing its current and voltage output to be increased. A direct reading meter having a linear scale indicates the percentage of oxygen in the sample. The indicator, which requires a sample flow of 25 to 75 cc per min, is available in standard full scale ranges of 0 to 0.5, 5, 10 and 25 pct.

CO_2 Detector

[3] Featuring extreme sensitivity to variations in the percentage of CO_2 in the flue gas, an instrument, announced by *Davis Emergency Equipment Co., Inc.*, 130 Halleck St., Newark 4, is said to record a change 3½ sec after the variation in CO_2 content of the flue gas has reached the analyzing cell, which is located close to the stack. Employing the principle of thermal conductivity analysis, new developments in cell construction permit the elimination of continuously operating suction pumps. The flow rate through the gas sampling line does not exceed 250 cc per min; the minimum flow required is 20 cc per min. No extensive filtering trains and dryers are needed. The pressure differential between the last pass of the boiler and the stack side of the barometric damper is all that is necessary to assure a constant free flow of gas through the analyzer cell at the desired rate. A Brown continuous balance Electronik recorder is used for recording changes. Control cabinet and recorder are panel mounted at any location convenient for observation.

Gaging Instrument

[4] Utilizing a new X-ray and electronic application for noncontact, continuous or spot checking of thickness of all types of moving materials, a gaging instrument known as the Measuray has been offered by the *Sheffield Corp.*, Dayton 1. The Measuray can be applied to almost any production process, it is said, where it is desired to measure and regulate the thickness of material. Accuracy

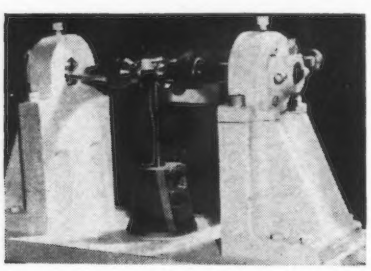


can be held to better than 1 pct of material being checked if required. It is suitable for use with brass, copper, steel, aluminum or any other metal; plastics, composition material, film, rubber, or foil. Concentricity can likewise be checked to measure a wire surrounded by insulation. Speed of movement of material whether at the rate of 5 or 5000 fpm has no effect on its accuracy, it is claimed, nor does the temperature of the room. The instrument is also a comparator, comparing the thickness of material with a sample of the same material which has the required known dimension. Standard units are equipped with indicating mechanisms, and recording and machine control

devices are available. No contact is required with the material to be gaged, and in some cases the nearest approach of any mechanical part of the instrument can be many inches away. Thickness, density and type of material, as well as tolerances to be checked, determine which of four units available is to be applied.

Fatigue Tester

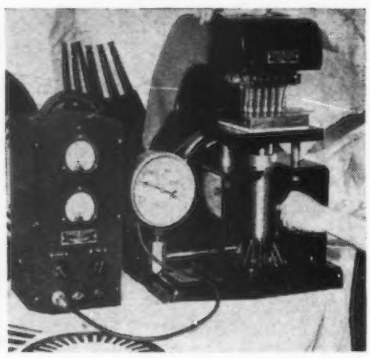
5 Using a pneumatic resonant principle, a testing instrument announced by *General Electric Co.*, Schenectady 5, fatigues parts such as turbine buckets, small assemblies and test specimens by reverse bending. The machine, which is one basic unit consisting of a fatigue motor, vibrates the test specimen at its own resonant frequency, closely simulating the actual dy-



namic loading conditions. An opposed cylinder type driving mechanism vibrates the specimen through pressure impulses when air pressure is turned on. Highest displacement of vibration is obtained by adjusting driving mechanism until frequency of pressure impulses is same as natural frequency of the specimen. Microscope and vibrating type reed frequency meters are furnished for direct reading of displacement and frequency. Furnace which permits testing at temperatures up to 1700° F is included in optional equipment listed.

Enamel Insulating Tester

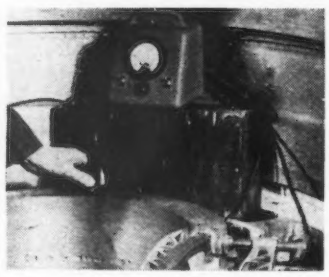
6 Designed to measure the insulating value of enamel coating on sheet steel or steel punchings, a core-plate enamel tester has been announced by the *General Electric Co.*, Schenectady 5. The tester is said to facilitate selection of the best enamel for any insulating application and is especially useful for testing rotor cores as it simulates the conditions of heating and pressure which may exist in a core. The test head, mounted on the upper plate of a C shaped hydraulic press, contains 10 insulated brass contact buttons backed by spiral springs which give independent pressures from 500 to 750 psi. These are mounted beneath a steel base upon which two ⅛-in. twist drills are located. A heater is mounted



on the lower plate of the press. In operation, the heater is brought up to the desired temperature, the specimen placed on and pressure exerted, forcing the specimen against the contact buttons which compress the springs and force the two drills into the specimen, forming a closed circuit. Good insulating properties are indicated by a low current reading on the ammeter when the control unit is switched on.

Magnetic-Field Gage

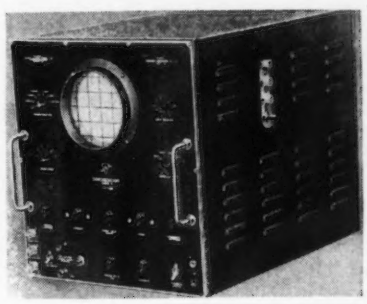
7 Announcement of a magnetic-field gage which indicates the relative strength of the magnetic field in parts which are being examined for flaws by the magnetic-particle method of testing has been made by *General Electric Co.*, Schenectady 5. The instrument is said to be especially useful for testing large castings and forgings in



which it is difficult to calculate the field intensity at various points from the current passed through the part and the cross-sectional areas. The gage assures a magnetic field that is sufficiently strong to bring out the particle pattern, so that defects of the same size give similar indications. By giving a direct indication of field strength, it permits standardized testing at fixed field intensities. The instrument measures both ac and dc field strength. It is small and portable and can be used wherever 115 v, 60 cycle power is available.

Synchroscope

8 Designed for the visual examination of periodic waveforms in television, pulse time modulation, sonic depthfinders, geophysical exploration and loran equipments, a synchroscope has been announced by the Electronics Div., *Sylvania Electric Products, Inc.*, 500 Fifth Ave., New York 18. The instrument includes a 5-in. cathode ray oscilloscope; trigger generator for synchronization; space for the addition of a video amplifier and r-f envelope viewer; adjustable time delay phasing circuits; and seven input connectors and selector switch for rapid viewing of separate ex-



ternal circuits. Television applications include study of the shape, amplitude and duration of video pulses ranging from a fraction to several hundred microseconds. Many combinations of trigger and sweep pulses may be produced to feed synchronizing pulses to a variety of external equipments at pulse repetition frequencies up to several thousand per second. Synchronized voltage waveforms are produced on the screen of the cathode ray tube for visual study. The synchroscope is rated at 200 w, 105-125 v, 50-60 cycle ac and is supplied with or without an r-f detector and video amplifier.

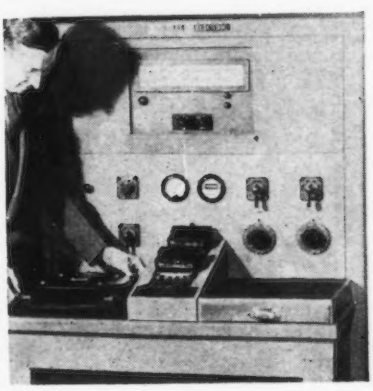
Impulse Scaler

9 Model 161 Scaler, a scaling device recently announced by the *Instrument Development Laboratories*, 817 E. 55th St., Chicago 15, is claimed to have wide application for tracer research in metallurgy, chemistry and related fields. The device operates on impulses from a Geiger-Muller tube, actuating an

external register once for each 64 impulses it receives. Features of the new scaler are its selfcontained high voltage supply and the fact that no preamplifier is required for use with a Geiger-Muller tube. The only external parts of the counting circuit are the Geiger-Muller tube needed to detect the radioactivity and the register which mechanically records the number of impulses.

Core-Loss Tester

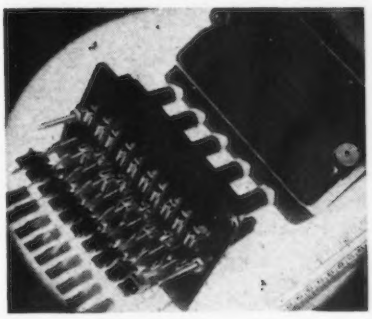
10 Designed to measure ac permeability and core loss in steel samples, a selfcontained, desk-type instrument announced by *General Electric Co.*, Schenectady 5, is said to fully meet ASTM specifications for measuring core loss and ac permeability at commercial power frequencies and inductions



up to 18 kilogausses. The instrument can be supplied with a power pack which holds constant wave shape and frequency, or it can be used with a sine wave generator for power supply. Eye-level indicating instruments are easy to read and wiring, instruments and switches are enclosed to prevent damage.

Test Switch

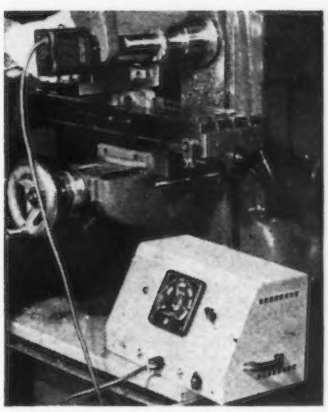
11 For rapid testing of switchboard instruments, meters and relays from the front of the board, a test switch has been developed by *Westinghouse Electric Corp.*, P. O. Box 868, Pittsburgh 30. Designed with up to 10 elements and rated at 250 v, 30 amp, combinations of current and potential switches are included as required for the various types of instruments to be tested. The switch is so constructed that a plug properly connected to the test instruments can be used to check from the front of the board in rapid succession all meters or instruments of a particular type. The compact Flexitest switch can be mounted semiflush on steel panels of the usual thicknesses. Individual switches are of the knife blade type



and separated by barriers. Switch handles are recessed for inserting identification cards.

Electronic Tachometer

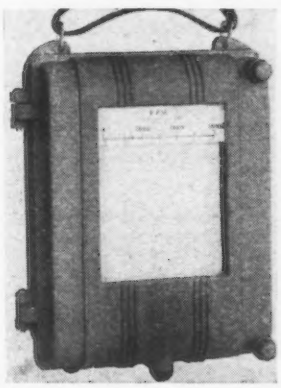
12 For measuring rotating speeds from 300 to 50,000 rpm, an electronic tachometer has been designed by the Special Products Div., *General Electric Co.*, Schenectady 5. Weighing only 19 lb, the tachometer tests equipment instantaneously without the necessity for any permanent attachments, indicating the speeds of electric motors, machine tools, automotive and aircraft engines, pumps, and other types of rotating equipment. The tachometer consists of a small pick-up head, flexible cable and a measuring unit with a panel-mounted



indicating instrument reading directly in rpm. A low-speed head provides five speed ranges, 0 to 1000, 2000, 5000, 10,000 and 20,000 rpm, while a high-speed head provides three speed ranges, 0 to 10,000, 20,000 and 50,000 rpm.

Tachometer Recorder

13 Designated as the Type CF-3, a lightweight inkless tachometer recorder to provide a record of rotating speed has been made by the Meter and Instrument Div., *General Electric Co.*, Schenectady 5. The recorder is designed to operate with an aircraft-type ac tachometer generator, although any ac generator with suitable characteristics can be used. Scale range is 0 to 3000 rpm. When used in conjunction with aircraft-style tachometer generators, the minimum indicated speed under normal conditions is 600 rpm and the maximum continuous speed is 2500 rpm. Readings are accurate to within 1.5 pct of full scale with full scale deflection obtained in 2 sec, it is reported. The enclosing case is

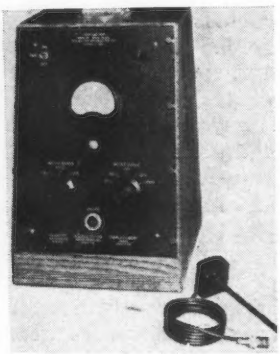


splashproof and weatherproof, of aluminum alloy casting. The instrument is furnished in portable form or for mounting on a wall or panel.

Vibrometer

14 Measuring vibration by electronic methods to determine the efficiency of a product, or process, is possible with the Model 11-B vibrometer announced by *Televiso Products Co.*, Chicago 34. The model detects sources of wear, strain and noise in new product development and in equipment manufacturing or test processes, thus reducing rejections, preventing breakdown, and aiding in lowering production costs. The instrument is an integrated, amplified vacuum tube voltmeter with a cable-attached search prod. It registers all three types of vibration: i.e., displacement, velocity and acceleration on a calibrated meter scale. Interchangeable fittings for the prod permit innumerable applications for field, laboratory or production use. The instrument, weigh-

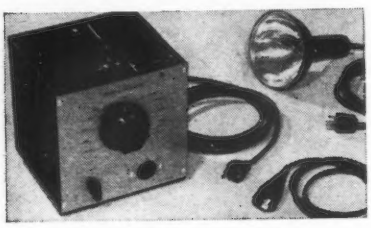
ing only 31 lb, operates on 105-125 v, 50-60 cycle, current. Frequency response is 5 to 2500 cps. Ranges of rms displacement are measured 0 to 0.01, 0.03, 0.1, 0.3, and 1 in.;



velocity ranges cover 0 to 1, 3, 10, 30, and 100 ips; five acceleration ranges are 0 to 100, 300, 1000, 3000 and 10,000 ips.

Motion Analyzer

15 The Torres portable motion analyzer developed by *Allan Mfg. Co.*, 24-16 Bridge Plaza, Long Island City 1, N. Y., for the inspection and study of moving parts and equipment in motion, employs a stroboscopic light source contained in a probe attached to a 5-ft flexible cable. Light pulsations are synchronized with the speed of the moving parts and give a "stopped"



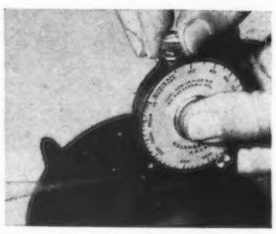
appearance. Production is not interrupted. Speed from 500 to 3600 rpm may be analyzed.

Electronic Timer

16 Called the Promatic, an electronic timer, featuring highly accurate control of industrial processes under virtually any condition of temperature and humidity has been announced by *General Control Co.*, 1200 Soldiers Field Rd., Boston 34. Promatic timers are said to allow either full automatic or semiautomatic control of the equipment to which they are connected. Two or more timers may be used to control a number of individually timed operations in a predetermined sequence, with either self-cycling or manual recycling. Control of the timing period is by means of a plug-in type condenser unit and a variable resistor. Five timing periods are available in ranges of ½ cycle to 1.2 sec up to 3 to 60 sec. The timer is available in both 110 and 220 v types, 60 cycles, ac, with relay contacts rated at 10 amp.

Vibration Measurer

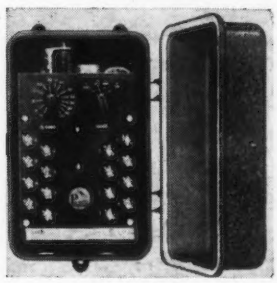
17 Capable of measuring vibration in a range of 450 to 50,000 cycles per min, the 5 oz Davey reed vibrometer recently announced has been designed for accurately measuring machine vibration and comparing amplitudes. The instrument, manufactured by the *Vibroscope Co.*, 6 East 39th St., New York 16, operates on the tuned reed principle through a steel reed which is described as snapping into a sharp



vibration when it comes into tune with the machine vibrations. When several disturbing frequencies form a complex wave, the instrument picks out each of the frequencies separately and evaluates its comparative amplitude. It is claimed the instrument can replace a complex noise analyzer for certain types of work.

Electronic Timer

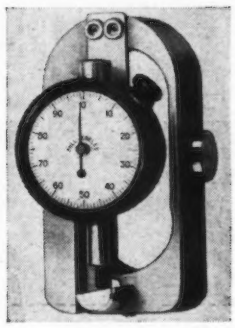
18 Type 30HL1 Photoswitch electronic timer developed particularly for process control and machine timing when long life, repeat cycle operation or precise accuracy is required for equipment such as spot welders, grinders, honing machines, drilling machines, conveyors, automatic filling machines and photographic printers, has been announced by *Photoswitch Inc.*, 77 Broadway, Cambridge 42, Mass. Capable of operation at any interval between 1/20 sec and 4 min with an accuracy variation of less than 2 pct, the instrument provides four basic types of timing: interval, delayed action, automatic repeat and programming, as well as many variations of these types which are obtained by changing external connections to the terminal board. Utilizing one tube and one relay, the



basic circuit has been designed so that it is selfcompensating for changes in line voltage.

Pressure Gages

19 A mechanical pressure gage which can be used to check pressure between spot welding machine electrodes, between platens in all types of presses, pressure between moving rollers, and tension in a moving thread, twine, wire, etc., has been announced by *W. C. Dillon Co., Inc.*, 5410 W. Harrison St., Chicago 44. Models range from 100 to 5000 lb capacity; are designed small to fit into heretofore inaccessible spots where pressures of static or moving parts must be measured. The gage works in vises, between all types of clamps and can be converted into a minia-

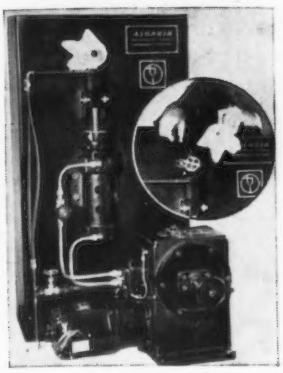


ture testing machine. It is said to be almost unaffected even by extreme temperature changes and can be used indoors or out.

Follow-Up System

20 Known as a Follow Up Unit, an air coupled hydraulic device which will follow the contour of a template cut from light gage stock or even stiff paper has been announced by the *Askania Regulator Co.*, 1603 S. Michigan Ave., Chicago 16. There is said to be no wear of

the template and the unit cannot deviate from the template's contour. It is designed to eliminate the necessity of constructing costly cams and to remove the travel limitations inherent in mechanical cam mechanisms. Power amplification can be a few pounds or several tons of output, for practically no input



force, it is said. The torque necessary to move the template cam is practically nil. The system is said to have an accuracy of about 0.002 in. with a speed of 20 ipm.

Pump Controller

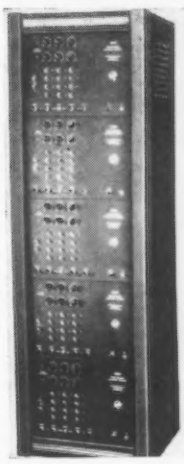
21 The Protectrol has been designed by the *Automatic Control Co.*, St. Paul 4, to prevent deep well or centrifugal pumps from running more than a predetermined interval without discharging water. Mechanical failure, lowering of the water table, or any other cause for water not being discharged will stop the pump and keep it from restarting until the Protectrol has been manually reset. The instrument is used in conjunction with a primary control either automatic or manual and is inoperative unless the primary control has called for pump operation by pulling the starter. The Protectrol is available in two types, the first of which is complete with alarm and alarm silencing circuits, and the second of which has no provision for alarms.

Electron Tube Testers

22 Two electron tube testers based on a patented circuit suitable for all standard receiving and several special types of tubes have been announced by the Radio Tube Div., *Sylvania Electric Products, Inc.*, 500 Fifth Ave., New York 18. The instruments, a counter type 139 and a portable type 140, provide accurate tube testing facility for shop, spot testing, industrial electronic applications and mobile radio equipment. Accurate check of receiving type tubes, FM, television, etc., may be made under dynamic conditions and without damage to tubes. Both instruments are supplied for 105-125 v, 50-60 cycle ac operation and are rated at 20 w.

Electronic Counter

23 Identified as Model No. 69-3 and designed to serve as a centralized control over a number of independent machine processes, an electronic counter in multiple, consisting of 5 dual predetermined electronic counters, has been developed by the *Potter Instrument Co.*, 136-56 Roosevelt Ave., Flushing, N. Y. Three standard Potter 4-tube decades are employed in the model, used for such diverse applications as the precision control of time sequences of events, time interval recording, the counting of small objects, the counting of radiation particles, and the totalization of variable quantities from several independent channels. Counting rates as high as 12,000 per min may be attained. For actuating the input to the counter a simple contactor or a photo-electric pick-up may



be used. The output is provided with a single contact double throw high-speed relay for initiating the control function which most often is performed by a fast acting solenoid.

Watt-Var Recorder

24 Permitting the recording of both watts and vars on a single instrument, a watt-var autoswitch has been made by the Meter and Instrument Div., *General Electric Co.*, Schenectady 5. The instrument is intended for use in central stations, industrial plant substations, and

TIME-SAVER CARD for your convenience in obtaining, without obligation, more information on any one or more of the new equipment items featured on this and preceding pages.

3/6/47

THE IRON AGE, New York 17, N. Y.

Circled below are items on which I request more information

☐ CATALOG ☐ NEAREST SUPPLY, SALES OFFICE ☐ PRICE INFO.

1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32

NAME..... TITLE.....

PLEASE STATE BUSINESS.....

COMPANY .....

CO. ADDRESS .....

CITY..... ZONE.... STATE.....

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NEW YORK 17, N. Y.

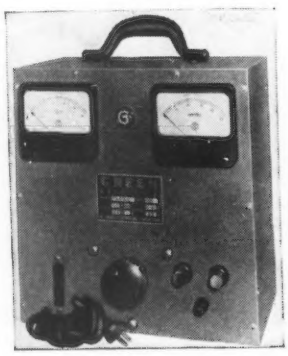
similar applications to check load lines to determine if additional power-factor correction is needed. This device gives information on the amount of corrective kva needed and at the same time records the power component, kilowatts. Both records are on the same chart, appearing as a series of fine dots, which merge into a solid line except under rapidly fluctuating conditions. The watt-var autoswitch is available in two types; portable and for semiflush switchboard mounting.

Test Lamp-Voltage Indicator

25 Features of electrician's test lamp and voltage indicator have been combined into one tool known as the Hi Tester which has been manufactured by *Holub Industries, Inc.*, Sycamore, Ill. Described as an inexpensive pocket instrument, the tester is said to offer the ultimate in safety, reliability and efficiency on both ac and dc circuits to locate grounds, opens, blown fuses, motors running single phase, tracing control and other circuits, and to indicate approximate voltage. The instrument is equipped with a filament lamp which gives definite signals in light or dark places and has only one test lead, which prevents shorting out the resistor. Both lamp and test lead are easily renewed.

Portable Bench Rectifier

26 Model No. 725S1C portable rectifier unit has been announced by *W. Green Electric Co., Inc.*, 130 Cedar St., New York. This rectifier, a complete dc power supply source with a capacity of 150 w, incorporates all standard Green Electric features, plus light weight and portability, making it suitable for laboratory and industrial applications, as well as for battery charging. Output is adjustable from 0 to 6 v and has a continuous capacity of 25 amp. The instrument features single-phase full wave circuit, using a quadruple protected selenium rectifier element of practically unlimited life, it is said. An on/off switch of the magnet circuit breaker type provides input protection; panel mounted fuse in the dc circuit provides output protection. A voltmeter with an accuracy rating of 2 pct full scale is connected across the output terminals and a matching ammeter indicates output current.



Ammeters and Voltmeters

27 A line of direct current moving vane type ammeters and voltmeters recently announced by the *U. S. Gauge Div., American Machine & Metals, Inc.*, 233 Broadway, New York, has been designed with exceptionally long, easy-to-read scales and pointer oscillation reduced to a minimum by the new high torque lightweight movement. Sharply defined numerals and graduations are lithographed on the warp-proof color fast metal dials, either with black characters on a white background or with white characters on black. Dials have a scale length of 80° of arc on the center zero type scale and 60° of arc on the zero off-center scales. The extra long 80° type scale is said to lead to greater accuracy of these ammeters. This feature combined with the exceptional pointer stability makes these ammeters suited for automotive, marine, tractor and diesel engine panels where severe vibration is encountered.

Electronic Flash Tube

28 Providing increased light output and designed for black and white and color photography, an electronic flash tube has been announced by the Electronics Div., *Sylvania Electric Products, Inc.*, 500 Fifth Ave., New York 18. The new type R-4340 tube provides a peak output of 48 million lumens. Daylight quality of the light, which produces an almost flat curve between 4000 and 7000 angstroms, makes it suitable for color photography where both intensity and color characteristics are important. Tube life is rated at more than 10,000 flashes with maximum repetition rate of four times a minute. In a suitable circuit this tube may be used for stroboscopic inspection of moving objects and for inspection of colored material in motion.

TIME-SAVER CARD for your convenience in obtaining, without obligation, more information on any one or more of the new equipment items featured on this and preceding pages.

3/6/47

THE IRON AGE, New York 17, N. Y.

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YOU NEED TO REDUCE THE WEIGHT OF YOUR SETTINGS

FUEL COST PER TON MELTED COULD STAND TRIMMING

POT LIFE SUFFERS FROM HOT SPOTS AND OVERHEATING

put KEMP on your "problem jobs" in tin, lead and salt melting

For example: those who alloy and refine the soft metals want lighter pots for easier tilting and cleaning between melts. KEMP immersion elements can be hoisted out at any time, leaving the pot clear—and all you have to tip is the pot itself, not a ton of brickwork.

For example: any tinplate mill can follow the cue of one of the largest in the East, and cut 40% off its gas bill by switching its stacks from side-firing (through the pot) to KEMP immersion-firing (inside the pot).

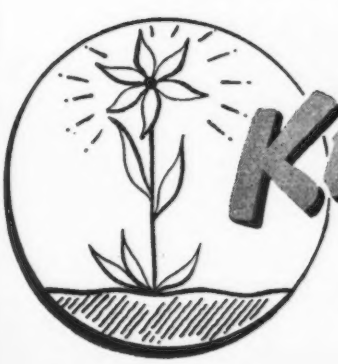
For example: heat treaters can minimize chemical attack by molten salt at the liquid line through KEMP pots with stainless steel bands welded in at that point.

And so it goes! The coupon below will put KEMP on the trail of your soft-metal or salt melting problems.

REMEMBER THESE VIRTUES OF KEMP IMMERSION FIRING

1. The pot is heated only by the molten materials. Therefore, the temperature gradient across the pot wall is *down* (not *up*) from the bath temperature.
2. No refractory structures are needed to form a combustion chamber. Light mineral wool insulation around the pot is all that's needed.
3. Spent combustion products are vented down over the bath. They blanket the surface to exclude air (reducing dross) and lower heat losses from the molten surface.

TYPICAL LEAD OR STEREOTYPE POT



PRECISION CARBURETION + ADAPTED COMBUSTION
FOR INDUSTRY'S HEAT-USING PROCESSES
ATMOSPHERE GENERATION & ADSORPTIVE DRYER SYSTEMS
FOR PROCESS CONTROL AND PROTECTION

JMLco K C1 1a

THE C. M. KEMP MFG. CO.
405 E. Oliver St., Baltimore 2, Md.

Send me more information on Kemp immersion-gas-firing. I melt for purposes of: alloying ☐ refining ☐ tinning ☐ patenting ☐ casting ☐ die casting ☐ salt bath treating ☐

..... ☐

NAME.....

POSITION.....

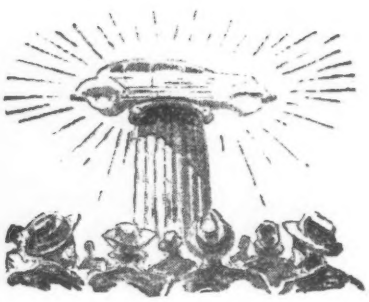
COMPANY.....

PLACE.....

Assembly Line . . . .

WALTER G. PATTON

• New postwar production records set . . . General Motors employes have received $3 million for suggestions . . . Kaiser-Frazer takes over engine plant in Detroit.



DETROIT — For the second consecutive week production of cars and trucks in the United States and Canada overshot the 100,000 mark to establish new postwar production records. According to Ward's Automotive Reports, estimated production for the week ended Feb. 28 is 104,802 compared with 103,400 the previous week and 17,575 a year ago. Output of the industry for the corresponding week of 1941 was 126,550.

Among the bright spots on the Detroit industrial horizon this week was the settlement of the L. A. Young Spring & Wire Co. labor dispute which had extended over a period of a month and seriously threatened supplies of seat cushion components. During the strike at the Young plant, other producers of wire items had been permitted to increase their output thereby minimizing the effect on the industry of the Young shutdown.

Extension of the existing contract between Chrsyler Corp. and the UAW-CIO offers further indication that both Chrysler and the union are apparently content to wait for a settlement of other labor controversies before settling their own differences. Most observers here feel that agreement on a new steel contract will have to take place before any agreement is reached by Chrysler and the UAW-CIO. The union and Chrysler are known to be at odds on pensions, paid-up insurance and other so-called union security items. Up to the present time Chrysler has given no indication that it is ready to meet the union's demand for an increase of 23½¢ per hr.

Meanwhile, many automobile executives watching present high levels of production have their fingers crossed about future steel supplies, particularly hot-rolled items. Because of the shortage of hot-rolled steel, automobile producers have had to substitute cold rolled for many applications previously calling for hot rolled steel. Specifically, these parts include seatbacks, rear deck cover inner panels, front door inside panels, side roof rails, dash panels and similar items. Automotive engineers point out that in each case such a change in specifications had to be made at some sacrifice in cost. What is more alarming to automotive steel buyers is the possibility that hot-rolled steel may still be short even after cold-rolled facilities have been brought into line with present automotive demands.

Failure to replace hand mills discarded during the war and the tendency of steel mills to favor cold rolled rather than hot rolled production are cited by automotive steel buyers as reasons for the present shortage of hot rolled steel.

Other short items on the automotive critical list this week included pig iron, copper and lead although it was foreseen that these items would be available in sufficient quantity to permit continuation of present production schedules provided steel supplies can be stretched to match.

EMPLOYE suggestion plans are being continued in the automotive industry and with considerable success.

Established in the war year of 1942, the General Motors suggestion plan has been successfully adapted to peacetime operation.

From the start of the plan through 1945 General Motors paid to its employes a total of approximately $3 million in awards.

Briefly, the plan provides for the award of either U. S. Savings Bonds or stamps to non-supervisory employes who submit acceptable suggestions for the improvement of quality or quantity of production, or the saving of material or labor costs, or the promotion of safety or health conditions. There are five classes of awards, ranging in values from $7.50 to a maximum of a $1000 bond.

Due to the strike earlier in the year 1946, the plan was operative only during 7 months of that year. However, during the operating period, employes turned in 28,457 suggestions. The suggestion committee in the various plants carefully reviewed 25,927 of these suggestions. The number accepted was 7024, or approximately one out of every four submitted.

Of those accepted, 6710 won awards under the printed regulations on which the plan is founded. Total awards amounted to $233,040.95. Twenty really ingenious workers who looked and thought farther than their everyday jobs came up with ideas worth the jack-pot maximum which is a $1000 bond. The values of the average award was $33.74.

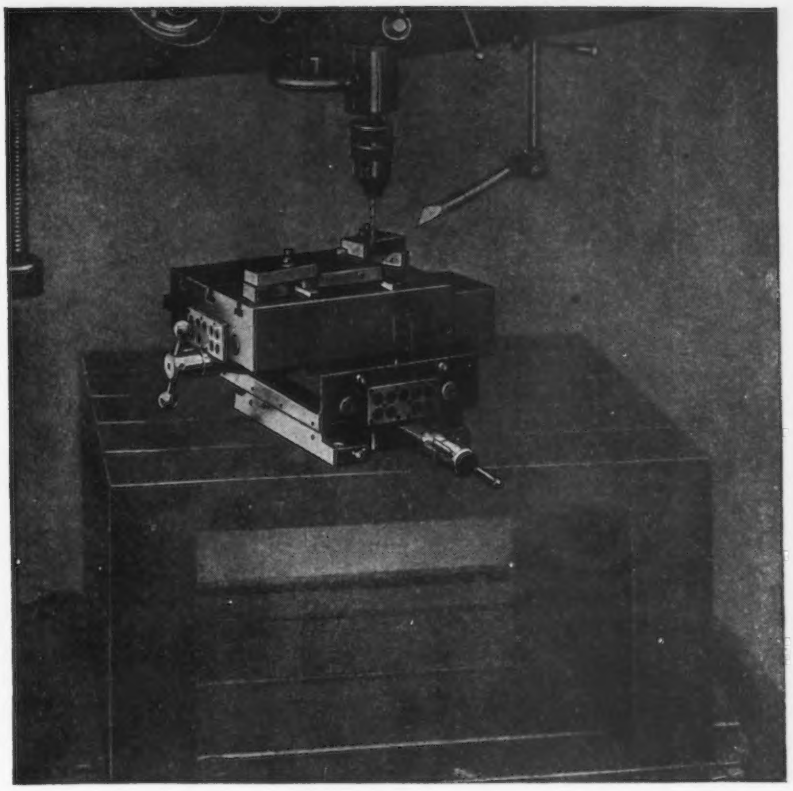
John M. Jerpe, director of the plan and president of the National Association of Suggestion Systems has admitted that the volume of suggestions now being received is somewhat less than it was during the war. This is expected, he said, because of the great opportunity for worthwhile ideas when General Motors was turning out tanks, airplanes, guns and many other war items which it never previously produced. He added that patriotism was a factor in the war years in the creation of these new ideas. The manufacture of automobiles and trucks is comparatively far more standardized, he said, with consequently less opportunity for thinking up new "know how" in shop practice.

The regulations under which the plan operates are available in book-

NOW . . .

without JIGS

. . . . *you can drill, bore, ream and tap . . . small work*

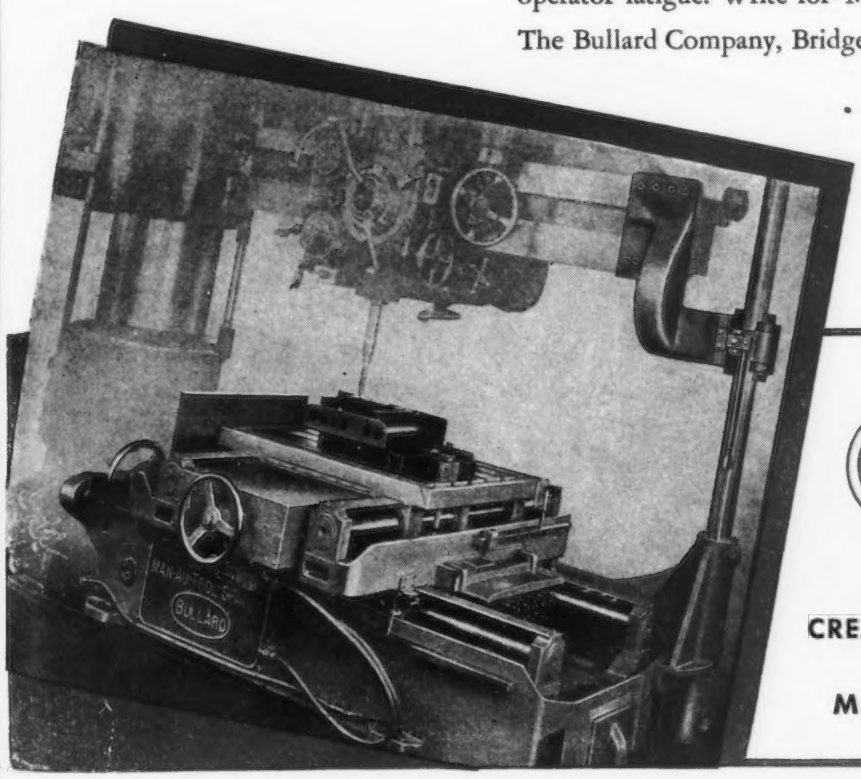


The new 4″x 4″ Bullard MAN-AU-TROL Spacer for speedily and accurately locating holes within a 4″x 4″ area . . . for use on smaller sensitive drills but usable on larger drills as shown. Its hydraulic unit will operate four 4″x 4″ Spacers if you so desire.

. . . as well as LARGE WORK

The new 30″x 20″ Bullard MAN-AU-TROL Spacer for accurately repeating a pattern of holes within a 30″x 20″ area . . . for use on radial drills.

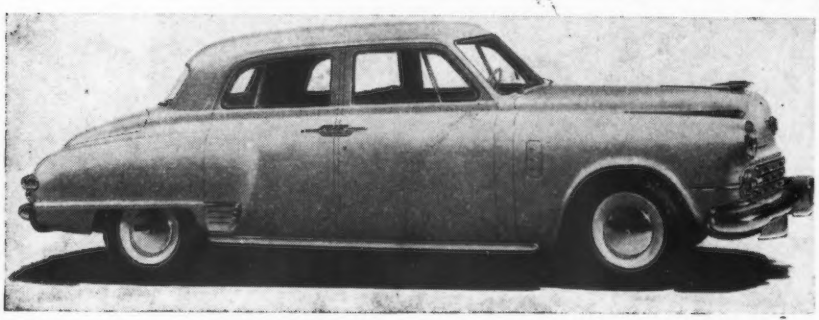
BOTH the 4″x 4″ and 30″x 20″ Bullard MAN-AU-TROL Spacers give you such benefits as: elimination of expensive jigs . . . no production tie-ups for making jigs . . . straight holes 90° to the work . . . prevention of strain on drill spindle and reduction of drill wear because of perfect tool centering . . . less operator fatigue. Write for MAN-AU-TROL Spacer Bulletin. The Bullard Company, Bridgeport 2, Connecticut.



Typical Installation of 30″x 20″ MAN-AU-TROL Spacer.

BULLARD

CREATES *NEW METHODS* TO MAKE MACHINES DO MORE



PRIDE OF SOUTH BEND: *Studebaker's new land cruiser follows the company's ultra-modern styling and is longer, roomier and more luxuriously appointed than any Studebaker models previously announced. The land cruiser which is available only as a 4-door sedan will compete in the luxury automobile field.*

let form to every General Motors worker. The rules safeguard credit for ideas for those who originate them. Also, mathematical formulas have been established whereby in many cases the workers can compute with fair accuracy the value of their suggestions in saving material or labor costs. Finally, the regulations provide that every worker who submits a suggestion must be given a written notice as to whether the idea was accepted or rejected and the reasons for the disposition in his case.

CONSTRUCTION is progressing rapidly on three new alterations to the Ford steel mills. This is in addition to the $1 million cold mill expansion to the present cold mill building described in THE IRON AGE, Feb. 20, p. 104.

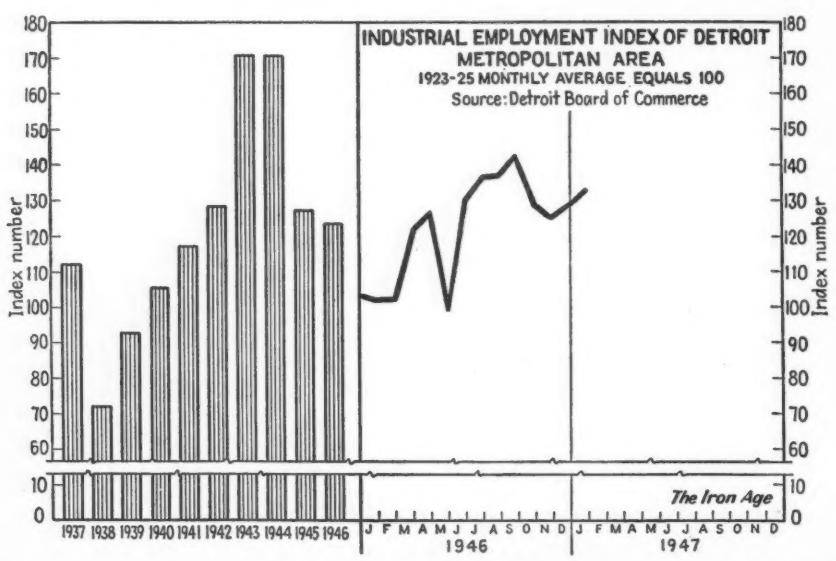
The new steel ingot mold preparation building is an addition to the present openhearth unit. The building will be 60 ft wide and 480 ft long and will be used to prepare molds for the openhearth pit.

An extension is being made to the pouring aisle in the openhearth building by the addition of a structure 75 ft wide and 120 ft long. This unit will be used for ladle repair and the housing of ganister handling equipment.

The new Ford stripper building is 80 ft wide and 280 ft long. This addition will provide space and modern facilities for removing molds from the ingots before the ingots are moved to the rolling mill soaking pits for heating.

A feature of the new unit is a 250-ton traveling stripper crane. This modern-type crane is suspended from an overhead crane and can be used either to remove the ingot from the mold or the mold from the ingot depending upon the type of mold being used.

Total floor space added by the new building in the steel mill group is 60,200 sq ft.



FOR many months, Kaiser-Frazer has been saying periodically that Continental Motors has been unable to supply a sufficient number of engines to keep pace with K-F's ambitious production plans. This week Kaiser-Frazer took a significant step to correct the situation by leasing that portion of Continental's Detroit plant now devoted to the production of Continental engines.

In announcing the new arrangement with Continental, Edgar F. Kaiser, vice-president and general manager of K-F said in part: "The delivery of engines to our plant has not kept pace with our productive capacity, which at the present time is a minimum of 600 automobiles a day. Minor modifications and additions now under way will in time permit our scheduled production of 1500 cars per day."

Engines for the Kaiser and Frazer cars are manufactured at Continental's plant in Muskegon as well as its Jefferson Ave. plant in Detroit. Capacity of the Detroit plant is 1000 engines per day while Muskegon is equipped to turn out 500 units. According to Kaiser, the Detroit plant has been turning out about 200 units a day and K-F hopes to increase production to 700 engines by May of this year.

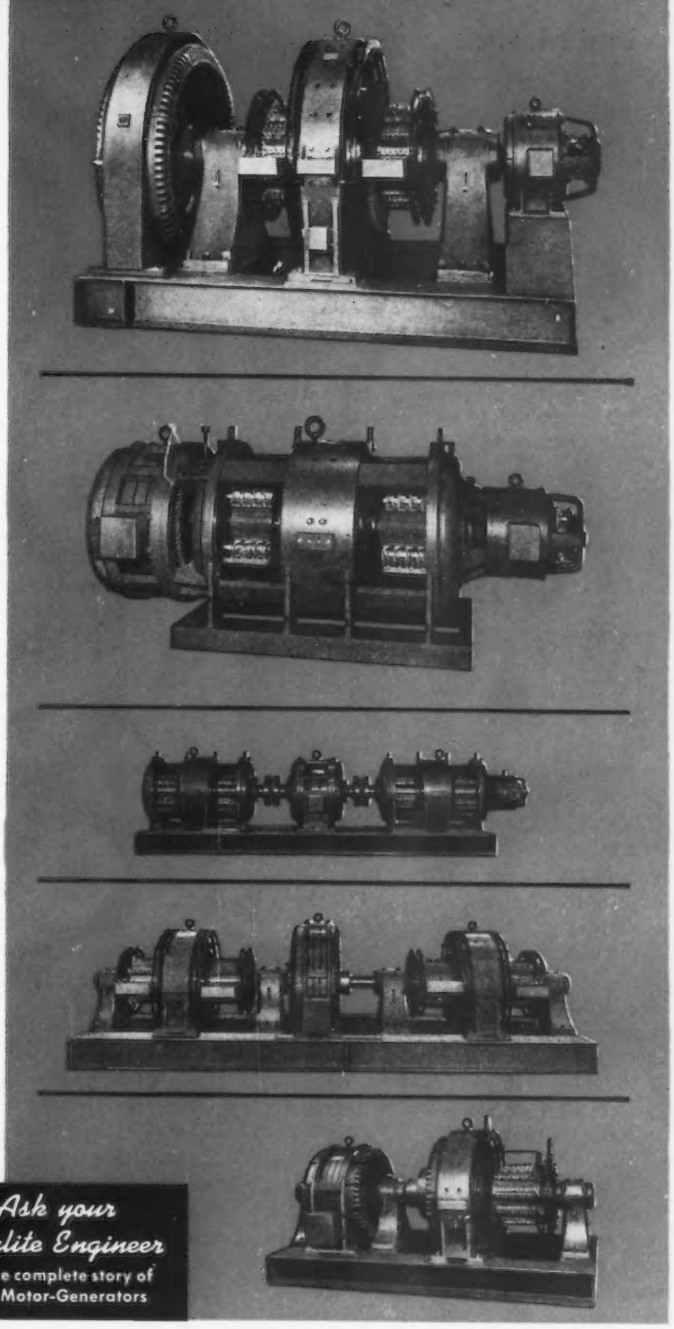
Kaiser-Frazer already has heavy investments in tooling at the Detroit plant. Under the new arrangement, K-F will lease for 5 years floor space and tooling from Continental, and engines will be produced under a royalty arrangement between the two companies. It has been reported that K-F also plans to turn out engines on the West Coast under the royalty agreement.

Production of engines for K-F at Muskegon will be continued by Continental. It is understood that production at the Muskegon plant has been increased substantially since the end of the year when labor difficulties slowed down engine deliveries to Willow Run.

E. J. Hunt, operations manager for Kaiser-Frazer will be production manager of the new K-F engine division. Approximately 1200 workers engaged in Kaiser-Frazer production in the Detroit plant will be shifted to the Kaiser-Frazer payroll, according to Edgar F. Kaiser.

motor generator sets

built especially for the PLATING SHOP



Udylite supplies the complete line of motor generator sets manufactured by the Electric Products Company of Cleveland for electro-plating, anodizing, electro-polishing, electro-cleaning, electro-galvanizing, and electro-coloring.

E. P. Motor-Generators are engineered to operate most efficiently under the typical plating room conditions.

E. P. MOTOR GENERATORS:

1 **Assure** a lower life-time cost A maximum life expectancy without replacement of major parts.

2 **Consume** less electricity: Ratings of 2500 amperes and above have a minimum guaranteed life-time efficiency of 75%. Savings from this high efficiency alone will frequently amortize the complete investment in only a few years.

3 **Provide** more amperes per dollar: Because of their inherent reserve capacity, E. P. Motor-Generators handle safely the frequent heavy overloads encountered in electrolytic service.

4 **Raise** low power factor: Ratings 1000 amperes and above, are driven by synchronous motors which supply power factor correction at no extra cost.

5 **Minimize** plating costs: Since the amount of current that flows through a plating solution varies with the voltage, the inherent constant-voltage characteristic of the E. P. Generator assures the same rate of deposit at all times, and thereby the lowest plating cost.

6 **Require** no special protective equipment: Thirty-four years of operating experience prove that E. P. Motor-Generators can function safely under the extreme conditions common to most electrolytic operations. Expensive forced-draft ventilating systems are not required.

7 **Need** very little maintenance: Year after year the only maintenance required for E. P. Generators is a periodic oiling and an occasional replacement of brushes.

2589

Ask your Udylite Engineer for the complete story of E. P. Motor-Generators

THE Udylite CORPORATION
1651 EAST GRAND BOULEVARD
DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES

Washington . . .

L. W. MOFFETT

• Predicted that Congress will ban unionization of supervisors, or will let employers disregard such organizations . . . NLRB has reversed itself on issue.

WASHINGTON — Conflicting decisions of the National Labor Relations Board constitute the basis for the muddle over the right or lack of the right of supervisors' union to be an appropriate collective bargaining unit. Present indications are that the Congress, even if it narrows labor legislation much more than was originally contemplated, will specifically either bar foremen and supervisors from joining unions, or provide that employers shall not be required to recognize such unions. Thus such employees will remain as a part of management. Such legislation, it is contended, will either stop or slow down drives to unionize supervisors.

The view that such legislation will be passed by sufficient votes to override a Presidential veto grows out of the experience of the 79th Congress when the Case labor bill was passed but failed of enactment by reason of President Truman's veto. The House failed by a small margin to override the veto. This House vote made it futile for the Senate to act on the veto. Even if it voted the Senate having supported organized labor more than the House did would have sustained the veto to a greater extent than the House did. The Senate now has a much larger vote to offset a veto.

In the Case bill was an amendment which specifically excluded supervisors from the scope of the Wagner Act. NLRB has at times said the act did not authorize unionization of supervisors. At other times the board reversed that ruling. It is now on record as approving unionization. One outstanding bitter dispute growing out of the finding concerns the Jones & Laughlin Steel Corp. which carried the case to court, shortly after the government took over the captive mines along with all other coal mines of the country after operators were unable to come to terms with UMW president, John L. Lewis. J&L challenged the right of the government dealing with a supervisors' union representing the corporation's mines. H. Parker Sharp, general counsel of J&L, recently told the Senate Labor Committee that, "Supervisory employees are management, and only a person desiring to change the American way of doing business would promote such a revolutionary undertaking."

THE Senate in the previous Congress voted 48 to 30 in favor of the amendment excluding supervisors from the Wagner Act. The present Senate has 71 opposed to unionized foremen and only 25 supporting their unionization, according to the Senate Labor Committee testimony.

The Packard Motor Car Co. now has the first case before the Supreme Court in which it asks that foremen be prohibited from unionization. The case is directed against the Foremen's Assn. of America and was argued Jan. 9.

The off-and-on attitude of the NLRB toward unionization or non-unionization of foremen and supervisors began in 1942, 7 years after passage of the Wagner Act. On June 15 of that year, the NLRB held that a supervisor's union was an appropriate collective bargaining unit. This finding was against the Union Collieries Co., Oakmont, Pa. As a result, mine foremen and supervisors organized as members of the United Mine Workers of America.

Reversing itself on May 11, 1943, the Board, passing on the Maryland Drydock case, said that organizations of supervisory workers were not appropriate bargaining units.

"There is nothing," said the Board, "in the Committee reports or in debates in the House and the Senate which would indicate that this specific problem was ever considered in Congress . . . it was traditionally recognized by all parties that the interests of foremen lay predominantly with the management groups."

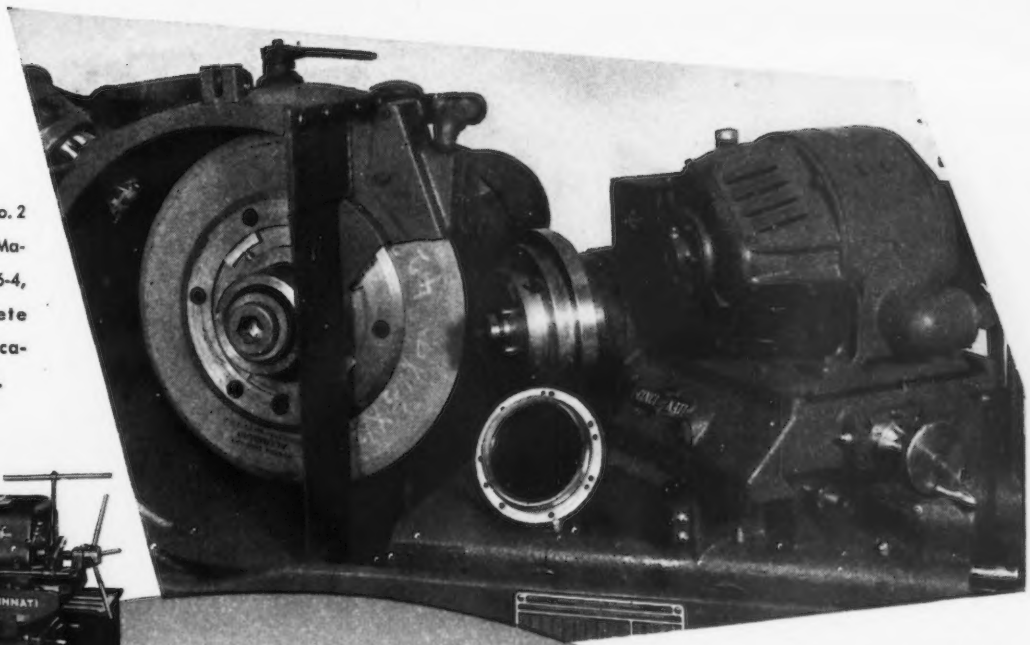
Coming on the heels of the ruling were hundreds of disputes relating to unionization of foremen and supervisors. Dockets of both NLRB and federal courts became jammed and a number of major industries brought to a standstill or halted to a slow tempo as the disputes raged.

THE ruling involving Packard was handed down by NLRB on Mar. 26, 1945. The Board held a foremen's union to be an appropriate collective bargaining union. But on the strength of a contrary finding in the Maryland Drydock case, Packard declined to recognize the Foremen's Assn. of America and took the case to the courts.

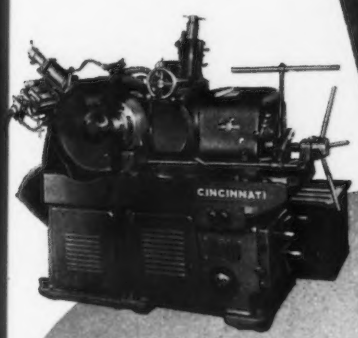
The next NLRB blast was on Mar. 6, 1946. It held that supervisors and foremen in the J & L coal mines constituted a suitable bargaining union. In the Krug-Lewis strike settlement agreement of May 29, 1946, the government, then as now in charge of the country's coal mines, obligated itself on the issue of unionization of foremen and supervisors "to be guided by the decisions and procedures laid down by NLRB." This government action caused an uproar and resulted in J & L taking the case to the courts on the grounds that the government had no authority to make such a commitment regarding privately-owned mines which are being temporarily operated by the government.

PRODUCTION of minerals and mineral products in the United States and Alaska in 1946 has been estimated by the Bureau of Mines at $8.9 billion, a 9 pct increase over 1945 . . . Business firms have increased in number from the wartime low of 2.84 million to a new high of 3.65 million, according to the Commerce Dept.

Wholly owned government corporations have requested about



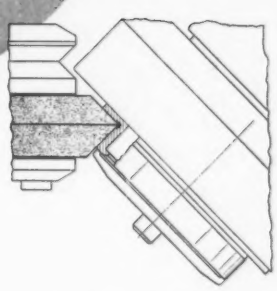
Below: CINCINNATI No. 2 Centerless Grinding Machine. Catalog G-456-4, containing complete engineering specifications, sent on request.



Cincinnati Filmatic Centerless converted into chucking grinder

Above: CINCINNATI No. 2 Centerless, with special motor driven chucking unit replacing upper and lower slides. The speed change unit, ordinarily employed to change the regulating wheel speeds, has been omitted since its function is taken over by a variable voltage headstock motor. Work speeds range from 40 to 300 rpm.

Like the majority of equipment developed by Cincinnati Application Engineers, the machine shown here—a CINCINNATI No. 2 Centerless Grinder—has a minimum of tailoring for a specialized operation—grinding the diameter and face of an adjoining flange on a family of bearing race retainers The regulating wheel unit was replaced with a special motor driven air operated chucking unit, and FILMATIC bearings were incorporated in the unit to eliminate bearing maintenance and gain all the other FILMATIC advantages. Equipment includes hydraulic truing fixture over the grinding wheel for truing two faces of the wheel at 45° angle. The machine is exceptionally easy to handle; the operator loads the chuck with his left hand and controls the infeed movement with his right. ¶Perhaps some of your grinding operations could be handled faster and more economically on basic CINCINNATI Grinders with special units designed for the job. Our Application Engineers will be glad to talk precision grinding with you.



Sketch above shows the grinding wheel and one of the larger parts ground on the setup described on the opposite page.
Name of part.....Bearing race retainer
Operation .....Grind diameter and flange
Production.....15 to 20 per hour depending upon size of part

CINCINNATI

CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

$11.4 billion in appropriations to carry them next year; funds would be used for loans, investments, commodity purchases, and to retire previously borrowed money . . . Real estate men estimate that over last year at least 121,000 residential properties were taken off residential rental lists for conversion to commercial use.

Monthly turn-over rates in blast furnaces, steel plants and rolling mills (30 per 1000 workers) are the lowest for the iron and steel industry as a whole (41 per 1000) the Bureau of Labor Statistics finds . . . Deaths caused by falls at home and at work (23,300) were exceeded only by those resulting from automobile accidents (28,100), these two causes representing half the nation's total 1946 accident fatalities (96,000), the Public Health Service reports.

Invitation for Bids On Canol-1 Issued by FLC

Washington

• • • **A formal invitation** to submit bids on Canol-1 on a "where is and as is" basis has been issued by the Foreign Liquidation Commission.

In addition to the pipeline and refinery, offered for sale are the power plant, $1 million worth of tankage, and miscellaneous equipment including trucks, tractors, cranes, power shovels, graders, rollers, pumps, machine shop and telephone equipment, and other items (THE IRON AGE, Jan. 23, 1947, p. 113).

There is no restriction on the number or combination of lots for which bids may be submitted. Also, Canada has agreed to consider waiving of excise and import taxes on property purchased for use in that country.

Latest NLRB Decision In Texas Labor Case Stirs New Interest

Washington

• • • **Particular interest** is manifest here in an NLRB decision in a Texas labor dispute in which the Board ruled that a 2-year contract is not of "unreasonable duration," regardless of the custom in the industry affected.

Involved in the case were the United Steelworkers (CIO) with which the Reed Roller Bit Co. plants in Houston made a 2-year contract in August 1945; validity of the contract was challenged by the International Assn. of Machinists (Independent), which sought to hold a new bargaining election in less than a year.

In effect the Board reverses a former ruling in which it opposed contracts of more than 1 year on the grounds that they prohibited free changes in bargaining agents.

This has since been modified, the Board ruling later that a 2-year contract could be held valid providing that agreements of such duration were customary within the industry involved.

"In the light of our experience in administering the Act," the recent decision stated, "we believe that a contract for a term of 2 years cannot be said to be of unreasonable duration."

House Curb on Portal Suits Starts Thinking On Price Reductions

Washington

• • • **In the first** attempt by Congress to correct abusive labor practices, the house has passed by a vote of 345 to 56 a bill which would virtually quash portal-to-portal pay suits.

It forbids bringing pay claims after one year, sets working time as that established by custom and frees employers of liability if they prove they acted in good faith.

Should the Senate follow the example set in the House bill the question has been raised as to whether, with industry freed of the fear of vast raids on its resources, the savings anticipated could not be directed toward lowering prices.

This speculation is based on complaints of steel and other industries that if such enormous claims against them were held valid it would inevitably result in further price increases.

No industry, however, has committed itself to lower prices. One reason is the uncertainty of prices that must be paid for raw materials, such as scrap, which have risen to dizzy heights. Likewise, the definite prospect of higher wages is held to be a block in the way of cutting prices.

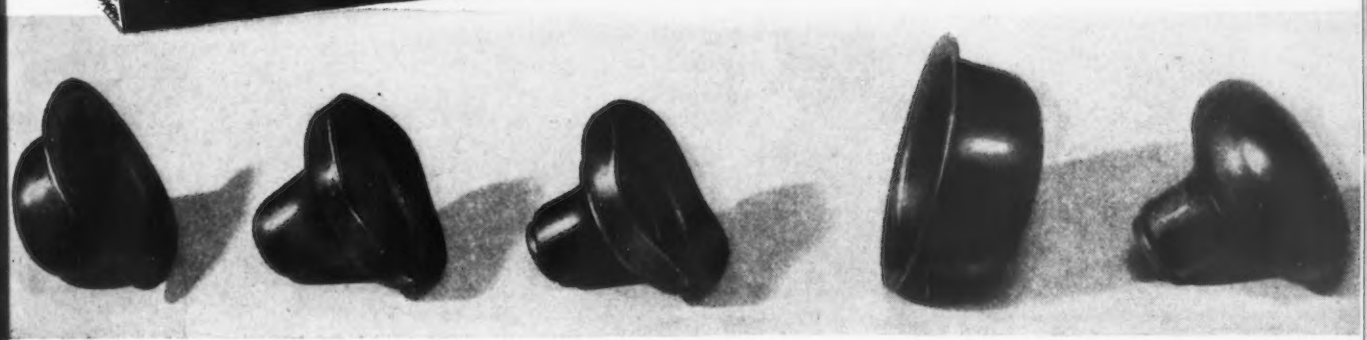
THE BULL OF THE WOODS — BY J. R. WILLIAMS

THEY'RE TESTIN' SOME NEW TOOL STEEL IN THEM SANDY HOLES-- THEY'VE GOT THEIR HEADS TOGETHER ON IT!
THAT'S THE ART OF LOOKIN' IMPORTANT-- I'D HATE TO TRY THREADIN' A NEEDLE AROUND HERE!
3-7
J.R.WILLIAMS
THE BARFLIES
COPR. 1947 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF

CARBOLOY (TRADEMARK) CEMENTED CARBIDE SHEET METAL DIES

Step up Die Life 10 TO 1 OVER STEEL DIES

In the manufacture of Metal Door Knobs for PACIFIC PLASTICS and MANUFACTURING COMPANY... maker of "Hollymade" Hardware



Successive steps in punching out metal door knobs by Pacific Plastics and Manufacturing Company

When Pacific Plastics and Manufacturing Company, fabricators of "Hollymade" Hardware, shifted from steel dies to Carboloy Cemented Carbide Dies for punching out metal door knob parts, here's what happened:

Die Life increased 10 times! (And at latest reports, these dies had not yet required grinding or polishing!)

That's money saved, time saved, production increased. And many other important advantages follow the change-over to Carboloy Cemented Carbide Sheet Metal Dies. For example—

Closer tolerances on drawn parts—fewer "rejects"—lower cost per piece—virtually mirror-smooth surface finish, with big reductions in buffing time—and sizeable increases in output-per-press.

• • •

If a letter of inquiry could lead to results like these in *your* plant, wouldn't you consider it time well spent? Why not write *today*—you'll receive by return mail our Booklet D-120, containing facts and figures that may start the ball rolling to big production improvements in *your* plant.

CARBOLOY COMPANY, INC., 11153 E. 8 Mile Blvd., Detroit 32, Mich.

CHICAGO • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES • MILWAUKEE
NEWARK • PHILADELPHIA • PITTSBURGH • THOMASTON, CONN.

West Coast

ROBERT T. REINHARDT

• California industries surveyed by press under State Chamber of Commerce and NAM sponsorship . . . Turbodyne engine may have wide application.

LOS ANGELES — Medieval alchemists who spent their lives searching for the catalyst to transmute lead into gold should be alive today to benefit by the enterprise, imagination and perseverance of the California State Chamber of Commerce and the National Association of Manufacturers which are determined that California's resources shall be transformed into the commodities of trade in the crucibles of western industrial plants.

By land, sea and air a group of reporters and editors were last week transported from town to town and industry to industry from Sacramento to Los Angeles to see and hear about what is happening, can happen and is planned for industrialization in this Central Valley.

If enthusiasm, sincerity and a willingness to work could do the job, California would soon equal or surpass any state in the nation industrially. Sacramento is fighting for a deep water channel to bring ocean going steamers to its gates; cotton growers are attempting to lure textile mills into the San Joaquin Valley; and steel users are trying to get more material. Everywhere growing pains of the industrial infant are producing howls of protest or pleasure—depending on where and whom they strike.

In San Jose, fifty miles south of San Francisco, Food Machinery Corp. is winding up a $7 million expansion program covering its 18 plants throughout the country. Local developments for the production of food processing and fire fighting equipment are getting a good share of this money. At Sunnyvale, near San Jose, Westinghouse Electric Co. is taking over all local operations of Joshua Hendy Iron Works on a 10-year lease basis with an option to purchase. This well-equipped plant is now turning out printing presses and other heavy machinery and such work will be continued along with the repair and maintenance operations of Westinghouse.

Bethlehem Steel Corporation's shipbuilding division in San Francisco is engaged in ship repair with a substantial backlog.

Friden Calculating Machine Co. in Oakland is looking forward to getting sufficient materials to erect a 75-ft by 450-ft new building to take care of increasing production and is now having some trouble in getting as much precision rolled strip steel as it could use. The $100,000 addition is expected to permit an increase of 350 employees to the present 1400. Completely integrated, and even producing its own 1/40-hp motors, Friden has whipped most of its materials supply problems. Walter S. Johnson, president, is optimistic over improved labor morale and stated that he believed local higher labor costs were being offset by more efficient production methods.

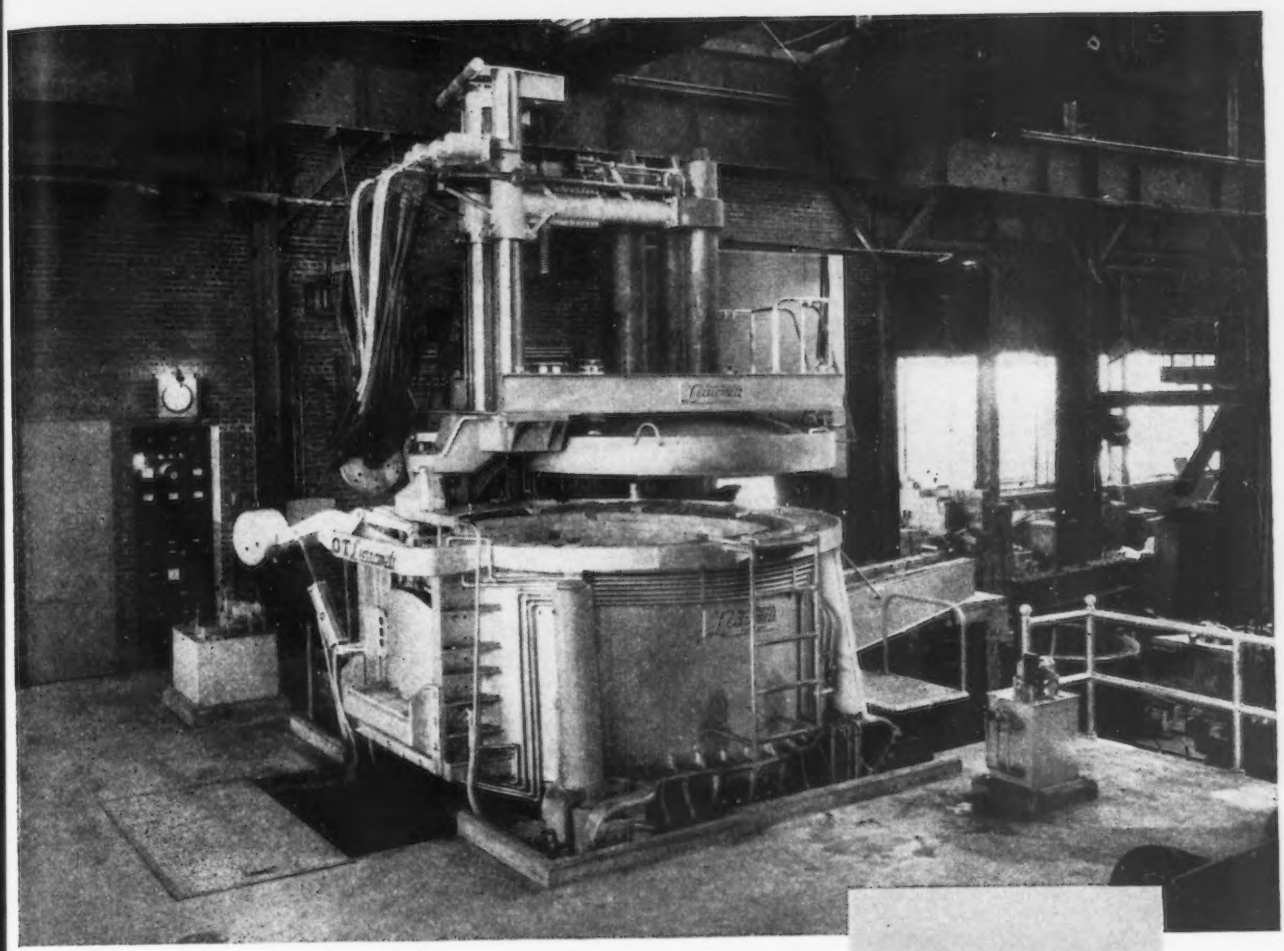
Contributions of the oil industry to the furtherance of a broader economy were highlighted by the California Research Corp., subsidiary of Standard Oil Co. of California, in Richmond; and the Agricultural Laboratory of the Shell Oil Co. at Modesto.

H. G. Vespers, president of California Research, demonstrated a new detergent widely used in industry, an anti-stripping agent said to make asphalt adhere more uniformly to rock, and an aluminum paint in which 450 mesh aluminum dust is carried in suspension in an asphaltic base. Roy Hansberry, director of Shell's laboratory, emphasized the importance of petroleum's chemicals in control of insects and for fertilization of crops.

PREFABRICATED home construction is getting a boost in Stockton where Precision Homes Co., with both prewar and wartime experience in this work, is reorganizing its manufacturing facilities and hopes to be in production in October turning out 15 homes a day. The new one and one-half million dollar plant will employ 48 men utilizing specially designed equipment such as mutiple nail drivers and electronic glue machines. Designs are limited to three basic floor plans which can be finished in several distinctive styles. Martel Wilson, president, stated that these homes complete with kitchen facilities, plumbing fixtures and ready to move into will sell from $5000 to $11,000 which is about 40 pct more than similar construction would have cost prewar, but 10 pct lower in cost than if built by standard methods.

Bakersfield is making a bid for industrial expansion through more complete utilization of the mining, agricultural and petroleum resources of Kern county which produces 34 pct of California oil and is famed for its production of more than 75 pct of the state's potato crop. Because the San Joaquin valley in which Kern county is located produces approximately one-half million bales of cotton a year —about five-sixths of the state's total—a concerted effort is being made to attract textile mills to the area. An engineering concern's study now being made has revealed that it costs California $18 million per year to ship raw cotton to eastern mills and have it returned as finished merchandise.

In Bakersfield, R. E. McCarthy is well along on his own industrial expansion program. Starting in 1932 as a small scrap dealer, he has developed a steel fabricating business which now has 25 employees and turns out approximately 500 tons of trusses, portable derricks, tanks and Latisteel structures a year. He is also starting production on metal clad buildings which he expects to compete with the Quonset type building.



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FURNACES

Time lost in charging can be the deciding factor between profit and loss in your production system.

Moore Rapid Lectromelt's top charging feature cuts this dead time to a minimum—as little as four minutes from "power off" to "power on". With Lectromelt you get more heats per working day, more tons per turn. More proof of Lectromelt melting economy.

Write for details.

PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH 30, PENNA.

While Latisteel construction is not new, having been developed before the war, according to Mr. McCarthy, it is now becoming increasingly popular for office, store and factory construction. The rolled and stamped shapes, which when welded together form wall panels on which a two-inch layer of concrete is poured, are supplied by Bethlehem Steel Co. in cross sections of from three inch to 16 inch.

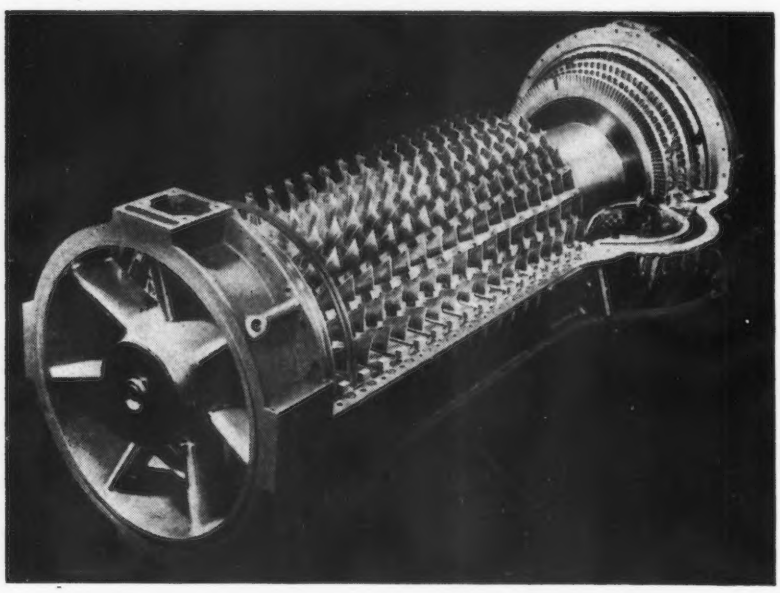
Another Bakersfield industry born less than 15 years ago and today held back in production only because of a steel shortage is the McKee Brothers Corp. which manufactures Lok-Cynch hose clamps from plated strip ⅜-in. to ¾-in. at the rate of 100,000 per month. Now employing ten men, McKee has world-wide distribution of the bands and the machine for applying them to hose of all types. The band was developed by Rexford McKee in 1936 when as an electrical contractor, he found a need for a satisfactory ground clamp.

SACRAMENTO'S proposed 90-mile deep water channel which would bring ships from San Francisco Bay to the city is estimated to cost approximately $14 million and would save shippers in 24 northern California counties and four Nevada counties $1 million per year in freight costs. Lack of such deep water facilities is said to be responsible for the loss of important industries to the area, and at present some 25 industries are looking for facilities. Pacific Can Co. has purchased a 40-acre site and will soon start construction of a $1 million plant which will make three such manufacturers in the area. Continental and American can companies are already in operation.

The new Campbell Soup Co. plant, which is reported will cost approximately $8 million on completion, will employ 1000 at the start of operations this year and eventually have a payroll of 3000.

While the press tour designed to stimulate industrial expansion was in progress two decisions important to the steel trade hung in the balance—the outcome of the protest against the lower freight rate from Geneva to the Coast and Attorney General Tom Clark's suit to prevent the sale of Consolidated Steel Corp. to Columbia Steel Co. The new rate was to have gone into effect March 1 and stockholders of Consolidated were to have voted on the proposed sale to Columbia on March 3. It was announced, however, that in view of the Attorney General's suit no action would be taken by the stockholders on the proposal.

NEW TURBINE: *Seven years of research are revealed in this "Turbodyne," an aircraft gas turbine developed by Northrop-Hendy Co., a firm formed by Northrop Aircraft and Joshua Hendy Iron Works in California. Its speed is in the neighborhood of* 10,500 *rpm, and combustion efficiency is* 94 *to* 96 *pct. It will burn a variety of fuels ranging from kerosene to* 100-*octane gasoline and development of units for locomotive service is under way. The blades, incidentally, are milled from bar stock.*



ONE industrial project which has been developing for seven years has just been announced by the Northrup-Hendy Co. which is jointly owned by Northrup Aircraft Co. and Joshua Hendy Iron Works. This is the Turbodyne engine designed for use in aircraft, but which may prove to have a wider field wherever great power is needed in limited space. Designers claim the new engine will have more thrust than any ever before developed.

Because of the extremely high temperatures produced, metallurgists are being given much of the credit for the success of the engine. Materials must withstand high stresses and excessive wear under intense heat.

The main shaft of the engine, located about center, has hndreds of blades on one end which compress the air by degrees until it is expelled under high pressure and mixed with fuel in the combustion chamber. Combustion takes place continuously. Its force is then directed against the turbine blades themselves at the other end of the main shaft, thus applying driving power.

One model of the Turbodyne has 2195 turbine blades, including those on the revolving shaft as well as on the stationary blades. Producing these blades is an intricate machining job for which a machine was devised using an elaborate eccentric guide to mill the blades out of bar stock. Varying both in pitch and airfoil section along their length, these blades are still more accurate than the blades turned out by modern casting and forging methods, according to engineers on the project.

Combustion efficiency of the engine may be as high as 95 to 97 pct and a variety of fuels can be used ranging from kerosene oil to 100-octane gasoline.

Tests are now under way at Northrup for application of the gas turbine power plant to locomotives. A low-cost fuel system has been advocated by John I. Yellot, head of Bituminous Coal Research, Inc., at John Hopkins University, Baltimore. Yellot's system, using powdered coal, would operate the gas turbine at very low cost, comparing favorably with the best diesels, according to Northrup officials.

this zinc coating "Rolls" with the punch

Like the boxer who rides with the punch, the special zinc coating on ARMCO ZINCGRIP "flows" *with the base metal* in severe forming and drawing operations.

Unlike the coating on regular galvanized, this specially-applied zinc coating clings tightly to drawn corners as well as flat parts. No bare spots are left for corrosion to feed on.

This means *unbroken zinc protection* for formed products of all kinds.

Results of various tests shown on this page clearly indicate the superiority of ARMCO ZINCGRIP for severe draws or lock-seaming. The American Rolling Mill Company, 1511 Curtis Street, Middletown, Ohio.

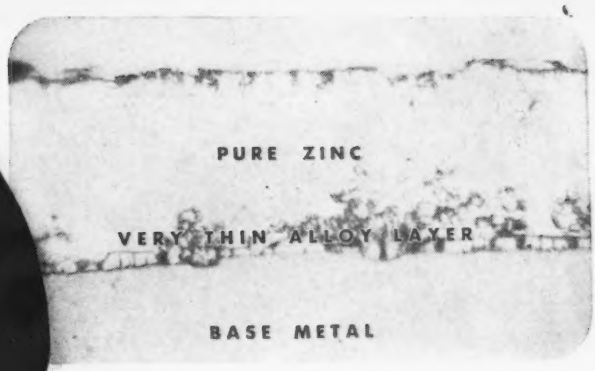
The American Rolling Mill Company

Special-Purpose Sheet Steels • Stainless Steel Sheets, Bars and Wire

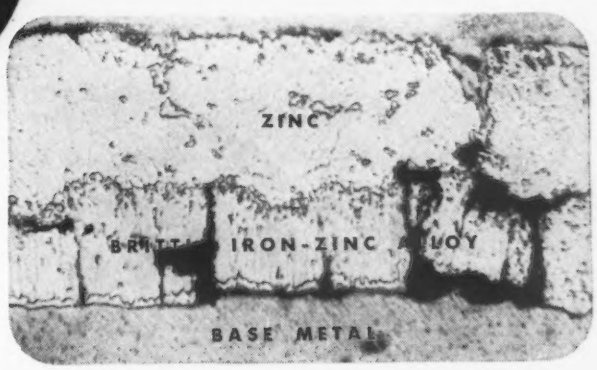
ZINCGRIP ★ ARMCO ★ STEEL

MORE SCRAP MEANS MORE STEEL

We urge you to collect every pound of iron and steel scrap, including unused and obsolete equipment. Speed it to the steel industry through your regular channels. Present high production cannot be maintained unless more scrap is shipped to the mills promptly. The situation is critical.

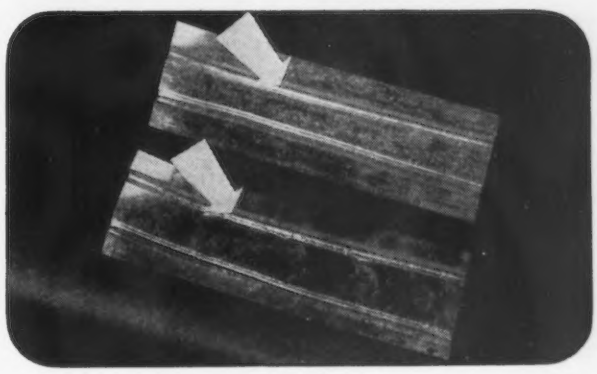


This highly-magnified coating on ZINCGRIP adheres to the base metal without peeling or flaking — after 20% stretching! Note that the iron-zinc alloy layer of this coating is very thin.



Magnified cross section of ordinary galvanized coating after the metal was stretched 15%. Dark areas are cracks through and beneath the heavy brittle, iron-zinc alloy layers, which cause the coating to flake or peel, or break away entirely.

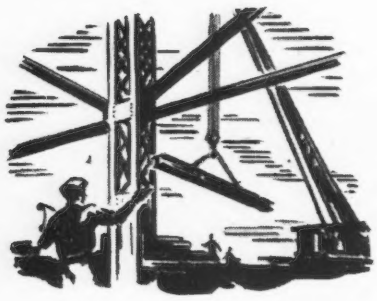
This impact tensile test shows how ARMCO ZINCGRIP (bottom sample) stretched to the breaking point without peeling or flaking. Regular galvanized (top sample) flaked badly long before the steel base could be broken.



The coating of this rolled bead on ZINCGRIP (top) is intact; but the regular galvanized coating flaked and fell off at the bead (bottom sample).

European Letter . . . JACK R. HIGHT

• Pending Anglo - Belgian trade agreement will provide heavy steel semis shipments to United Kingdom . . . Britain attempting to exchange long-term contract for special price concessions from across Channel.



LONDON—Discussions have been going on intermittently for some weeks to develop a new bilateral trade agreement between Belgium-Luxemburg and the United Kingdom. Principal desire of the United Kingdom in the affair is to get some steel delivered from these two countries at a decent price. The Belgian export price is a very sore point with the British industry, as the latter has by a deliberate mingling of subsidies and self-control kept prices far below those of its neighbor across the channel.

Belgium and Luxemburg have been acquiring an adverse trade balance with England, through heavy purchases of manufactured goods, and are anxious to adjust that balance. It has not been a matter of urgent concern, as the exports of the rich Belgian Congo during the war permitted that country to acquire a substantial balance of sterling exchange, but this nest egg is dwindling. They are having no difficulty in selling their steel at prices far above what British officials are willing to offer, and are probably taking an extremely cagey position in the struggle.

British Government sources state, however, that the whole deal is tied irrevocably to the delivery of steel, and without such commitments, the whole affair will fall through. The negotiations are still on the government level, but it seems certain that the talks are coming to a satisfactory conclusion, as I have been told that the representative of the Belgian sales cartel, Sybelac, has already been called to London to discuss the business details with Capt. H. Reid, the representative of the British Iron & Steel Corp., which does all the importing for the British Federation.

First action in the deal will be, I am informed, the delivery almost immediately of 89,600 tons of semis from across the channel. The importance which British officials have placed on obtaining this tonnage with immediate delivery gives an indication of the tightness of semis for the British industry.

The demand for immediate delivery has been considerably scaled down as when initial requirements were laid out before trade discussions began the British industry was asking for 168,000 tons for immediate delivery. The semis now being discussed with Belgium and Luxemburg are in the first instance the same material that the British industry tried to purchase from the U. S. four months ago (see THE IRON AGE, Oct. 24, 1946, p. 96).

BUT British negotiators are dangling new bait before the eyes of their European friends in present circumstances. What they could not offer in the U. S. was any logical assurance that shipping semis in this seller's market would assure sales in a buyer's market in 1949 or 1950. What both parties knew when Sir Andrew Duncan was in New York was that as soon as market conditions assume a more normal pattern Britain will buy her semis from much closer sources.

In discussions with officials from Belgium the British are offering a long-term contract, possibly on a 5-year basis, for semifinished steel deliveries in return for a substantial price reduction on the part of Belgium and Luxemburg. How long the contract can be hammered out will be largely dependent on the patience of both parties concerned as both groups are already giving private indications that whatever happens they themselves will be coerced into a bad bargain.

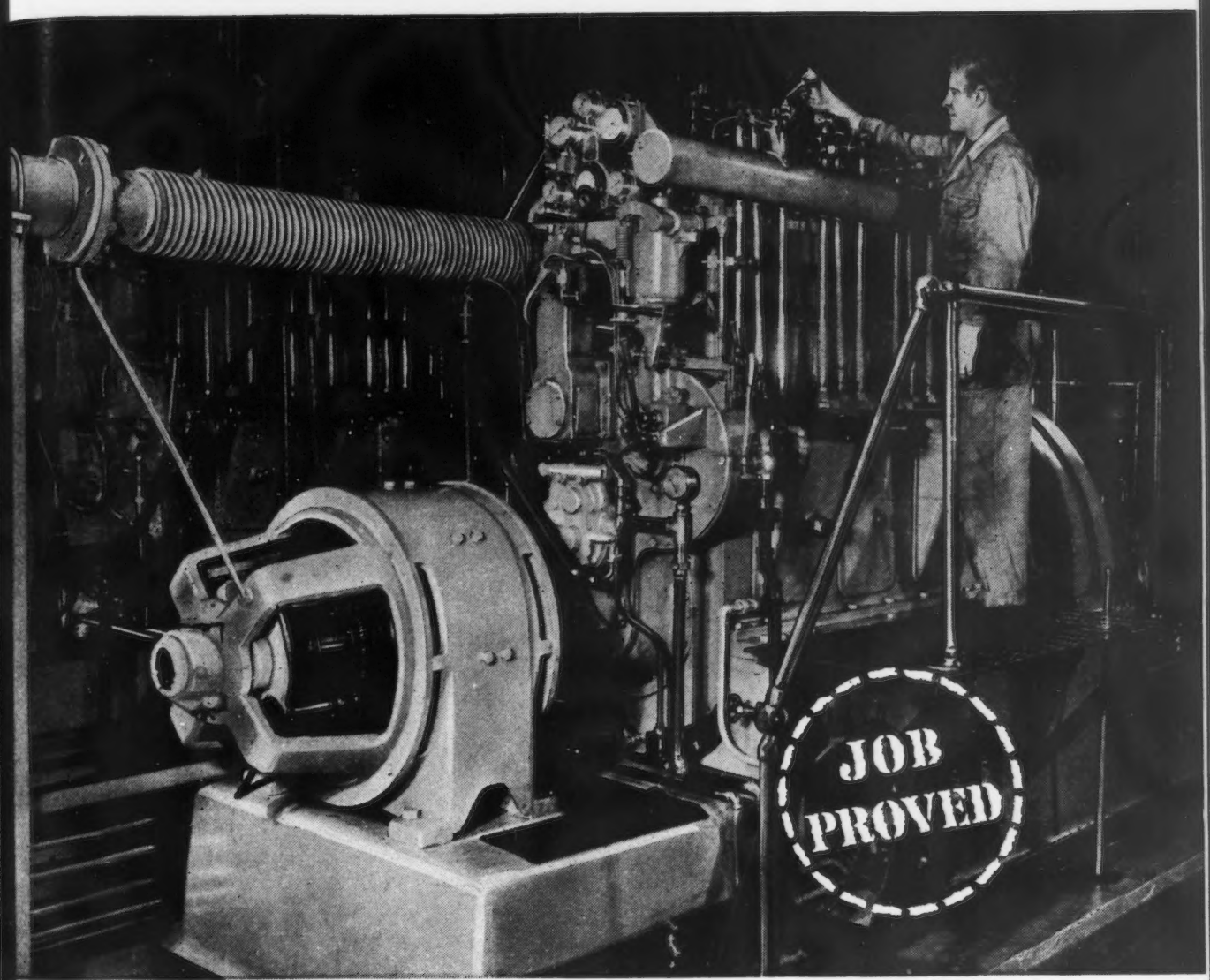
Informal British opinion is that Belgium is asking prices for steel which are nothing short of piracy, while Belgian sources point with scorn to the hidden subsidies which write off the excessive cost of imports into Britain as well as subsidizing ore imports. In addition heavy British Government subsidies on food and other materials for workmen make it possible to keep wage levels in the British industry lower than would otherwise be possible.

What tonnages of steel will be involved in the overall agreement are not clear, but it is understood that Luxemburg is informally committed to supply 40 pct of the initial figure of 89,600 tons for immediate delivery, while the balance is to be supplied by Belgium. Belgian producers are pressing hard for a clause in the agreement which will specify the delivery of up to 3300 tons of ferromanganese a month to alleviate the serious shortage. Belgium is receiving some small tonnages from Norway, but supplies in general are very difficult.

BACK benchers in the British Parliament have been attempting to pressure the government into removing the import duties on Belgian steel for the very small tonnages which are handled by private companies, but without success. In the case of the bulk tonnages the material is handled by the government, and, although in theory the duty is paid, it is a question of the government taking money out of one pocket and putting it in the other.

Trade discussions have also begun between Britain and France, with the latter country anxious to secure a larger opening in the British markets. Sir Stafford Cripps' austerity policy for Britain dealt a serious blow to French exports to Britain inasmuch as most of the prewar items which the English obtained from France were in categories which the Board of Trade calls luxuries and are therefore barred. At present Britain hold $4 million worth of French francs from exports made to assist France's reconstruction, and it seems certain that some plan of promoting French imports in at least

Two Years Without Repairs, Replacement or Overhaul



SUN DIESEL LUBRICANT . . .

Keeps Two Diesels in Perfect Condition and Puts an End to Frequent Overhauls

A municipal plant which uses two 125-horsepower Diesels for pumping was confronted with a serious lubrication problem. Oil was forming sludge with the result that frequent shutdowns and overhauls were necessary.

A Sun Engineer was called in and after careful analysis recommended a Sun "Job Proved" oil specially refined to stand up under the particular operating conditions.

With Sun oil in the crankcases, the engines were kept in regular service for more than two years. Sludge disappeared. Oil consumption dropped. Mechanical repairs, replacements and overhauls were reduced to practically nothing. There was no excess carbon formation.

The ability to solve problems like this is typical of "Job Proved" products and of Sun Engineers. Wherever you have a tough problem involving petroleum products, whether in power plant, machine shop, mill or factory, call your nearest Sun office or write Department 1A3.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

SUN

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INDUSTRIAL PRODUCTS

sufficient quantities to utilize those francs is certain to be evolved.

An indication of the pulling and hauling which goes on with industry and government in the world today is brought to light in the case of a factory owned by a Belgian steel firm which is located in Luxemburg. The rolling mill machinery which was located in the plant before the war employed about 1000 men, but during the war was completely stripped by the Germans, so that since the end of the war the building has been standing idle.

On the demands of the Luxemburgian Government a new factory is being opened by September of this year which will produce phenol from the steel firm's supply of benzene from its coke works. Exactly how much coercion was applied by the government of the country would be difficult to assess, but the general understanding was that if the Belgian firm failed to take immediate steps to get those 1000 men back at work and off the dole, the firm's essential supplies of minette ore from Luxemburg would be forthwith cut off.

AS outlined in THE IRON AGE, Feb. 13, 1947, p. 86, the British organized North German Iron & Steel Control has founded the Huettenwerk Oberhausen A/G as the first of four companies which are being formed to take over the assets of steel producing units in Germany. British reports from Germany indicate that British military government officials are watching a growing deficit of Russian zone exports to the British zone with a cautious eye. Existing barter agreements call for 27,500 tons of steel from the Ruhr to the Russian zone for the next 7 months. If possible, without drawing attention to the fact, British policy on such a matter would be to cut off the steel shipments, probably for "production difficulties," as soon as it became evident that a deficit of goods was being built up by Russia which could not possibly be made up.

The pending approval of the South Wales tinplate development program by the British Government is still awaited. The statement by the firm seems to have had the desired result inasmuch as, although the firm did not formally submit the proposal to the government Steel Board until Jan. 30, members of the House of Commons are already pressing the government for a decision on the modernization program. The best reply which the government has been able to offer up to the present is that the proposal is "receiving urgent examination."

Reports from Prague indicate that deliveries of Russian iron ore to Czechoslovakia this year are expected to total 700,000 metric tons of ore of 58 pct iron content. Some sources suggest that iron and steel prices in Czechoslovakia may be increased substantially in the near future.

British Disposals Of Surplus Stores in '46 Reached $1320 Million

London

• • • **A sum of $1320 million had been realized up to the end of 1946 from the disposal of United Kingdom surplus war stores, $1040 million at home and $280 million overseas. This fact was disclosed by Arthur Woodburn M.P., Joint Parliamentary Secretary to the British Ministry of Supply, at a press conference held in London recently.**

In 1943 a company entitled Iron & Steel Disposals Ltd. was formed for the purpose of disposing of surplus government stocks of iron and steel, and during 1946 sales by the company totaled 2,340,800 tons, realizing $50,032,000. The chief aims of the company have been to remove surplus material from contractors' sites so as to make space available to start up manufacturing for peacetime needs, and to dispose of the material to manufacturers whose need for it was urgently required for reconstruction purposes.

The company is also responsible for the sale of salvaged iron and steel scrap from the battlefields of North Africa and Europe. An agency in Germany, in liaison with the Control Commission, is responsible for collecting and shipping iron and steel from Germany to Great Britain. From Germany alone it is hoped to obtain at least 268,800 tons of scrap iron and steel during the first half of 1947. This material will take the place of scrap which prior to the war was imported from the U. S.

Over 80,000 vehicles were sold by auction up to the end of the year, realizing approximately $30 million. This year at least 100,000 vehicles will be handed over by the Armed Services for disposal at auction sales. These will include a percentage of private cars in need of little repair, and priority for them will be given to disabled ex-servicemen and midwives.

The total value of sales of machine tools up to the end of 1946 was over $104 million, totaling 92,000 machines. During last year 1600 light aircraft were sold to clubs and for personal use, and 89,000 tons of aluminum were recovered from broken down aircraft, to be used for the construction of aluminum houses. The coal shortage in Great Britain has led to urgent demands for power-driven generators, and 13,000 were disposed of in January this year.

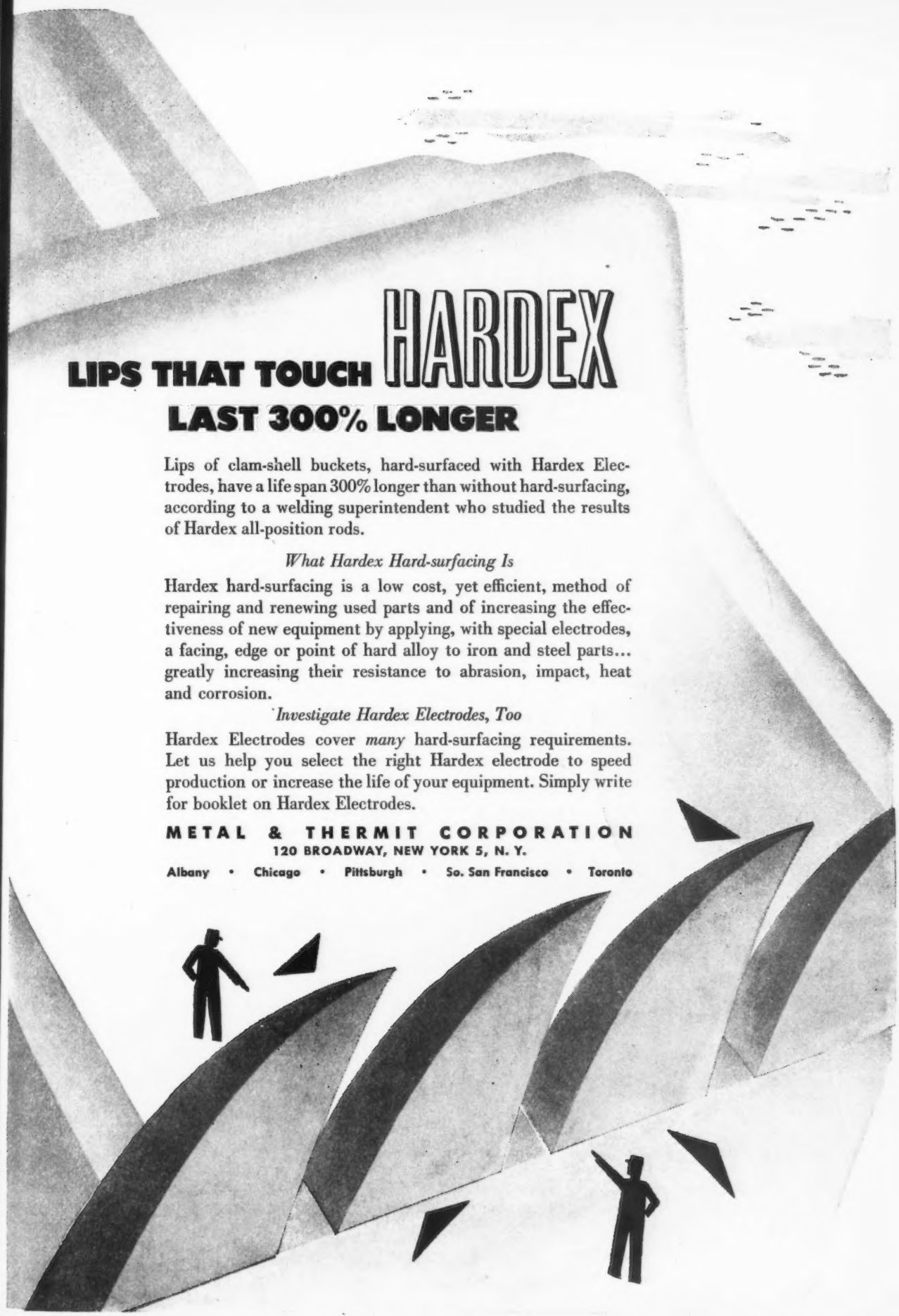
Under agreements with the United States and Canadian authorities, the British Government acquired title to all United States and Canadian owned stores located in the United Kingdom (see THE IRON AGE, May 16, 1946, p. 106), except things wanted for UNRRA. It was stipulated with regard to these goods that they must not be exported to either America or Canada.

It is estimated that two-thirds of the surplus articles have already been disposed of, and that by the end of this year the stores will be practically exhausted. There will be a dimishing return after August next, and only a small labor force will be used to break down supplies.

Grants Finnish Credit

Washington

• • • **A credit of $2,500,000 to be used in financing purchases of machinery and equipment for Finnish expansion has been extended by the Export-Import Bank to the Finnish-American Trading Corp., recently established in the United States to promote sales of Finnish-produced goods in the American market.**



LIPS THAT TOUCH HARDEX LAST 300% LONGER

Lips of clam-shell buckets, hard-surfaced with Hardex Electrodes, have a life span 300% longer than without hard-surfacing, according to a welding superintendent who studied the results of Hardex all-position rods.

What Hardex Hard-surfacing Is

Hardex hard-surfacing is a low cost, yet efficient, method of repairing and renewing used parts and of increasing the effectiveness of new equipment by applying, with special electrodes, a facing, edge or point of hard alloy to iron and steel parts... greatly increasing their resistance to abrasion, impact, heat and corrosion.

Investigate Hardex Electrodes, Too

Hardex Electrodes cover *many* hard-surfacing requirements. Let us help you select the right Hardex electrode to speed production or increase the life of your equipment. Simply write for booklet on Hardex Electrodes.

METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK 5, N. Y.

Albany • Chicago • Pittsburgh • So. San Francisco • Toronto

PERSONALS

o o o

• **William M. Lappe** has been named personnel director of the Washington Steel Corp., Washington, Pa. Prior to taking up his present duties, Mr. Lappe was supervisor of progress for the organization during the construction of equipment for the new mill. Before becoming associated with the Washington Steel Corp. he was purchasing agent for the Canonsburg Steel & Iron Works.

• **William D. Taylor,** who has been engineer of tests for Lukens Steel Co., Coatesville, Pa., has been appointed assistant metallurgical engineer, and **Samuel D. Lemmon,** who has been assistant engineer of tests, has been appointed engineer of tests. Mr. Taylor entered the employ of Lukens as an apprentice metallurgist in 1936. Mr. Lemmon came with Lukens in 1939.

• **Hans Gartmann** has been appointed chief engineer of the centrifugal pump and compressor department of the De Laval Steam Turbine Co., Trenton, N. J. He has been associated with De Laval since 1924, first as a designer of centrifugal pumps and compressors and later as a hydraulic engineer. **Harry Engvall** has been appointed chief engineer of the helical gear department of the company, with whom he has been associated for 23 years. **Harold V. Rasmussen** has been named chief engineer of the turbine department of De Laval. Mr. Rasmussen has been associated with the company since 1941.

• **Joseph H. Carter** has been named president; **J. K. Beeson,** executive vice-president; **Joseph A. Voelker,** vice-president; and **J. H. Morrison,** vice-president in charge of operations of Pittsburgh Steel Co.'s wholly owned subsidiary, the Pittsburgh Steel Products Co., Pittsburgh. **Thomas C. Phillips** and **Robert L. Glose** have been elected vice-president in charge of sales and general manager of sales respectively.

• **Boyd R. Hopkins** has been named sales manager of the Girdler Corp.'s Thermex Div. He succeeds **C. C. Brumleve,** who has resigned. Before being appointed sales manager, Mr. Hopkins was eastern district manager for Thermex, with headquarters in New York.

• **Joseph D. Ritz,** chief chemist at the Pittsburgh works of the Jones & Laughlin Steel Corp., has retired after 53 years with the corporation. Mr. Ritz started with J&L in 1893 as an analyst at the Pittsburgh works. In 1905 he was made assistant chief chemist of the South Side plant and in 1937 was appointed chief chemist for the Pittsburgh works.

ROY E. SMITH, president, Continental Bridge Co.

• **Stevens A. Bennett** has been elected chairman of the board of Continental Bridge Co., Chicago. **Roy E. Smith** has been made president; **Stanley A. Archer,** vice-president of sales; and **John W. Gifford,** secretary-treasurer. Mr. Smith, new president, came to the company recently from the Kelly Steel Works, Inc., where he was vice-president in charge of sales.

• **Carl A. Eversman** has been promoted to plant superintendent of the Lorain, Ohio division which makes oil stoves and heaters for American Stove Co. He has served as industrial relations manager of the plant since 1945 and will retain this position along with his new responsibilities. The position of plant superintendent was formerly held by the late **Albert C. Roeger.**

• **E. W. Meyers, Jr.** has been elected executive vice-president and **G. F. Landgraf,** vice-president in charge of engineering, of the Pittsburgh Range Co., McKees Rocks, Pa. Mr. Meyers was formerly controller and a director of Rockwell Mfg. Co. and vice-president of all Rockwell subsidiaries. Mr. Landgraf was with the Bartlett-Hayward Div. of Koppers Co. as precipitator engineer and had been associated with that organization in several technical capacities for 6 years. Prior to that he was chief metallurgist of Lebanon Steel Foundry.

• **A. J. Sherman** has been named factory superintendent and **Jesse W. Elliott,** assistant superintendent, of the Monarch Machine Tool Co., Sidney, Ohio. Mr. Sherman has been with Monarch since 1916; Mr. Elliott, since 1935.

• **Earl H. Bodinson** has joined the sales staff of Hammond Iron Works. He will make his headquarters in their New York offices, where he will assist R. E. Kramer, vice-president in charge of sales. Mr. Bodinson has been identified with Illinois Steel Co., Joseph T. Ryerson & Son, Inc., and lately with the Pittsburgh Steel Co.

• **Samuel L. Moffatt** has been appointed superintendent of the openhearth department of Portsmouth Steel Corp., Portsmouth, Ohio. Mr. Moffatt was formerly superintendent of No. 4 openhearth department of Gary works, Carnegie-Illinois Steel Corp.

• **Roy Farquharson** has been elevated to the position of assistant chief engineer of Pioneer Engineering & Mfg. Co., Detroit. He has spent 11 years with Pioneer.

• **H. Follett Hodgkins,** president of Lipe-Rollway Corp., **W. H. G. Murray,** president of Smith-Murray Corp. and **Frederick B. Scott,** president of the Syracuse Supply Co., have been elected directors of Carrier Corp., Syracuse.

• **Robert A. Nisbet** has been appointed superintendent of the Waterford, N. Y. works of General Electric Co.'s chemical department. He has been assistant general foreman in the silicone pilot plant for the past 2 years.

• **George W. Marshall, Jr.** has been appointed general sales manager, asbestos products division of Raybestos-Manhattan, Inc. Mr. Marshall started with the U. S. Asbestos Co. in 1929 as purchasing agent, prior to the merger with Raybestos-Manhattan, Inc., and has advanced steadily. In his new position, he will continue as general manager of the asbestos textile and packing division and in addition will direct the sales activities of the corporation's equipment sales division, and will make his headquarters at the corporation's Chicago offices.

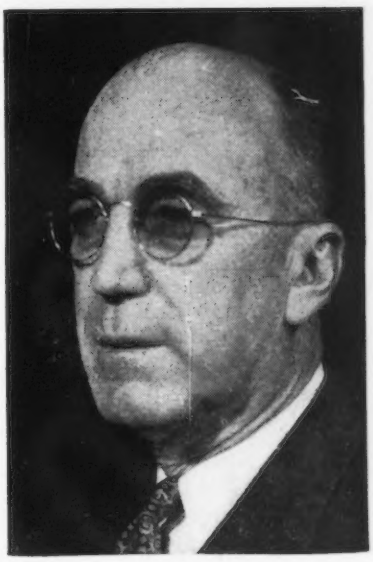
• **A. W. Guenther,** export manager for Harnischfeger Corp., Milwaukee, has been transferred to the firm's Los Angeles branch office to take care of export trade there.

• **Richard L. Erlin** has been promoted from general sales service manager to manager of rolled steel products sales of the Kaiser Co., Inc., iron and steel division, Oakland, Calif. He is being succeeded as general sales service manager by **O. D. Hole, Jr.,** who joined the iron and steel division of Kaiser Co. last October. Both Mr. Erlin and Mr. Hole formerly worked in various sales and administrative capacities for subsidiaries of the U. S. Steel Corp.

• **Sydney J. Keith** has been named public relations supervisor for Packard Motor Car Co., Detroit, succeeding B. M. Henkel. Prior to his Packard appointment, Mr. Keith was a member of the Automobile Manufacturers public relations staff.

• **William H. Fellows** has been appointed specialized abrasive engineer to serve the foundry trade in metropolitan Chicago and the midwestern area for Bay State Abrasive Products Co. of Westboro, Mass.

• **A. L. Rich** has been appointed traffic manager of the Fruehauf Trailer Co., Detroit. **I. C. Moreau,** formerly chief engineer of the hoist and body division of Gar Wood Industries, Inc., has been made assistant manager of the Tank-Trailer Div. of Fruehauf Trailer Co.



L. M. MORLEY, vice-president, Minneapolis-Honeywell Regulator Co.

• **L. M. Morley** has been elected a vice-president of the Minneapolis-Honeywell Regulator Co., Minneapolis. Mr. Morley, vice-president in charge of sales for the Brown Instrument Co., a wholly-owned Honeywell subsidiary at Philadelphia, will continue to supervise sales of the industrial control devices made by the Brown division.

• **Robert F. Whitworth** has been appointed division sales coordinator of Gar Wood Industries, Inc., Detroit. Prior to the war, he was associated with the Great Lakes Steel Corp.

• **R. M. Palmer,** formerly with the General Motors Corp., has been named sales engineer for Reo Motors, Inc., Lansing, Mich.

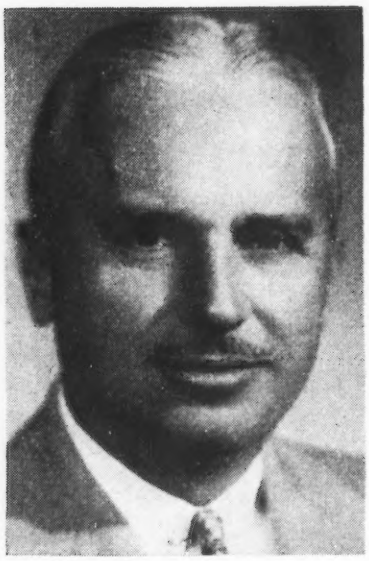
• **Richard A. Gourley** has been appointed assistant district sales manager of the Pittsburgh district sales office of Aluminum Co. of America. Mr. Gourley has been affiliated with Alcoa since 1926, and previous to his present appointment he served in the New York sales office. **Leon Veitch** has been appointed district traffic manager at the New Kensington, Pa. works of the Aluminum Co. of America. **G. H. Walter** has been made assistant superintendent of the sheet division of Alcoa, and will make his headquarters at New Kensington.

• **Ralph E. Larry** has been elected vice-president of Pittsburgh Limestone Corp. with headquarters at New Castle, Pa. He succeeds **H. L. Gordon,** who is retiring after 28 years of service with this U. S. Steel subsidiary. Mr. Larry has been assistant to the president at the company's headquarters in Pittsburgh for several years, after serving successively as plant superintendent, supervisor of operations, engineering assistant to general manager, and supervisor of industrial relations. He started with Pittsburgh Limestone in 1921. Mr. Gordon was assistant general manager of the company's New Castle operations office from 1919 until 1940, when he was elected vice-president.

• **R. R. Hutchinson** has been appointed assistant chief engineer of Pontiac Motor Div. of General Motors Corp., Pontiac, Mich. **George A. Delaney** becomes chief engineer, replacing Ben H. Inibal, who recently became administrative assistant to Harry J. Klinger, general manager. **D. J. Dunlop** has been named assistant to general manufacturing manager, S. W. Ostrander, of Pontiac Motor Div. **Buell E. Starr** is the new manufacturing manager in charge of the following departments: Master mechanic, motor, axle, sheet metal, heat treat, laboratory, plant engineering, foundry, assembly, plating and trade school. **Ray J. Longpre,** general superintendent of material, becomes production manager in charge of the material department, parts warehouse, traffic and central stores. **A. F. Johnson** has been appointed general night superintendent, and **A. V. Handren** will handle special assignments.

• **Lloyd S. Knight** has been appointed manager of the New York division of the James Flett Organization, Inc. Mr. Knight was formerly in charge of the Detroit division and his place will be taken by **Elmer T. McCleary.**

• **A. J. Bedworth** has been appointed assistant general planning superintendent at the Willow Run, Mich. plant of Kaiser-Frazer Corp. Mr. Bedworth joined Kaiser-Frazer a little over a year ago, and was formerly associated with Chrysler Corp.



WILLIAM KERBER, vice-president in charge of sales, Hanna Furnace Corp.

• **William Kerber** has been named vice-president in charge of sales of Hanna Furnace Corp., Buffalo. Mr. Kerber was at one time deputy assistant director of the War Production Board's steel division, and served later as assistant to the president of the Hanna Furnace organization. He succeeds the late **E. Kay Ford.**

• **Leonard C. Truesdell** has been appointed vice-president in charge of marketing, Hotpoint Inc., Chicago. Mr. Truesdell was formerly general sales manager of the radio division of Bendix Aviation Corp. He will assume his new duties with Hotpoint on Mar. 10.

• **John W. French** has been appointed sales manager of the production finishes department of the Arco Co., Cleveland. Mr. French joined Arco in 1940.

• **Perry D. Gasnier** has been appointed manager of the newly established Detroit office of the Davis & Thompson Co. Mr. Gasnier was formerly associated with the Cincinnati Milling Machine Co. as sales and field engineer.

• **K. R. Troyer** has been promoted from manager of the hydraulic press division to sales manager of all divisions of the Columbia Machinery & Engineering Corp., Hamilton, Ohio. Mr. Troyer joined the Columbia organization in 1946.

• **James G. Gammel** has become sales promotion and advertising manager of the brush division of the Osborn Mfg. Co. of Cleveland, to succeed **G. O. Rowland,** who has resigned after having been with Osborn for 12 years. Mr. Gammel came with Osborn as a member of the sales promotion and advertising departments in 1939.

• **Ralph E. Gordinier** has been appointed chief research and design engineer of Eco Engineering Co., Newark, N. J. Mr. Gordinier was with Special Engineering, Inc., where for the past 7 years he worked as assistant chief engineer, product engineer, and on special assignment in the firm's Detroit and Philadelphia offices.

• **H. Templeton Brown** has been elected to the board of directors of the A. M. Castle & Co., Chicago. Mr. Brown is a member of the firm of Mayer, Meyer, Austrian & Platt, and he will fill the vacancy created by the resignation of **Alfred C. Castle. Carl C. Mueller** has been elected vice-president in charge of the Seattle branch and **John B. Robbins** has been elected vice-president in charge of the Kansas City branch of the same organization.

• **Marion B. Sawyer** has joined Bardco Mfg. & Sales Co., Los Angeles, where he will be in charge of special motor development and sales. He will retain an affiliation, as a consultant, with Sawyer Electrical Mfg. Co., which he founded in 1928.

• **Earl S. Guild,** former plant engineer at Ranger Aircraft Engines, Farmingdale, L. I., has joined the BullDog Electric Products Co., Detroit, in the capacity of field engineer. He has been assigned to the Washington office under M. C. Nelson to cover the North Carolina portion of the Washington territory.

• **R. B. Lundy** has been assigned by the Brown Instrument Co., Philadelphia, as its sales engineer for the Northern Wisconsin and Upper Peninsular of Michigan territory. He will make his headquarters at Oshkosh, Wis.

• **Julius F. Lovell** has been appointed assistant controller of the Norton Co., Worcester, Mass.

• **John O. Tragard** has been appointed eastern regional sales manager of the Fulton Sylphon Co., Knoxville, Tenn. His new duties include supervision of the territory north of Richmond, Va., and from the Atlantic seaboard west to Buffalo. Mr. Tragard joined Fulton Sylphon as eastern regional sales manager on Jan. 1 and after one month at the Knoxville plant, established headquarters in New York.

OBITUARY...

• **Herman W. Falk,** 79, founder of the Falk Corp., Milwaukee, died Feb. 17. He was chairman of the board of Falk and also chairman of the board of the Heil Co. and a member of the executive committee of the Allis-Chalmers Mfg. Co.

• **Charles E. Reichenbach,** 65, assistant treasurer of Pittsburgh Steel Co., Pittsburgh, died Feb. 23.

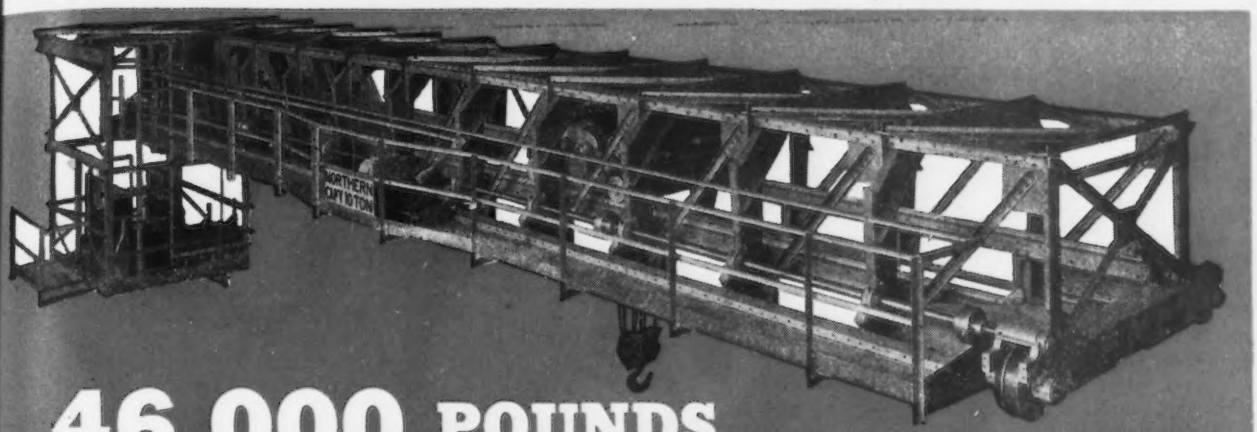
• **C. H. Fitzwilson, Sr.,** 64, development engineer of the market development division of Carnegie-Illinois Steel Corp., Pittsburgh, died recently. He had been affiliated with the U. S. Steel Corp. and its predecessor companies since 1900.

• **Anthony C. Anderson,** comptroller of General Motors Corp., Detroit, died Feb. 22. He joined General Motors as an assistant comptroller, becoming comptroller in 1936.

• **Edgar G. Pascoe,** 50, senior partner in the Southern Amiesite Asphalt Co., Birmingham, died Feb. 16 after a short illness.

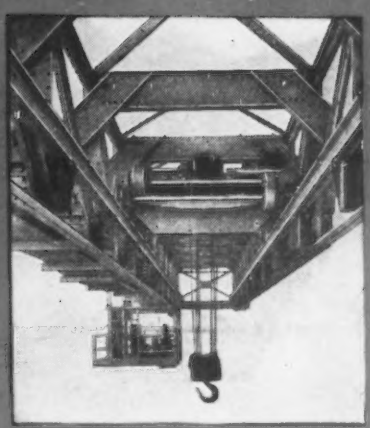
• **Edward E. Walker,** 65, president of the Walker Corp. and Van Products Co., and former president of the Erie Malleable Iron Co. of Erie, Pa., died Feb. 19.

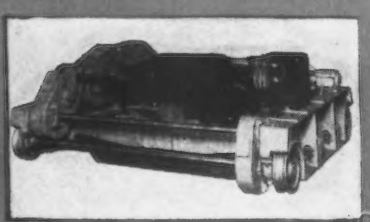
• **Anton C. Stadler,** 78, treasurer of the Norcor Mfg. Co., Green Bay, Wis., died recently after a long illness.



46,000 POUNDS WEIGHT SAVED

ALUMINUM CRANE built by NORTHERN ... In Satisfactory Operation over 15 Years





Illustrated here is a crane of 10 ton capacity, 76' - 6" span, built almost entirely of aluminum alloy castings and rolled aluminum structural sections. The total weight including the trolley is only 30,000 pounds. The same crane, constructed of steel, weighs 76,000 pounds.

Six of these cranes have been in continuous service since 1929, and have proved satisfactory in every detail. The light weight has substantially reduced the cost of power. Operation is speeded and usefulness increased by the faster acceleration and deceleration. Light weight reduces wear on operating parts, and materially reduces the load on the building itself.

Use of aluminum in construction of these cranes is a unique application of light metals in the material handling field.

2074

NORTHERN ENGINEERING WORKS

General Offices: 2625 ATWATER ST.
DETROIT 7, MICH.

HEAVY DUTY CRANES • LOW HEADROOM CRANES
BUCKET CRANES • TRANSFER CRANES • ELECTRIC HOIST CRANES • HAND CRANES • ELECTRIC HOISTS
AIR HOISTS • SPECIAL CRANES AND HOISTS

Dear Editor:

RE: THE NATHAN REPORT

Sir:

In the article, "Develop New Approach to Wage-Profit-Price Relationship" in your Feb. 13 issue, the authors, Blackett and Dalby, contend that a 21 pct increase in hourly earnings of labor employed by manufacturing corporations at the 1946 production level would raise wage costs by $13.1 billion. I should like to call your attention to a paragraph on p. 11 of our report on "A National Wage Policy for 1947": "Total manufacturing production workers' payrolls in the last quarter of 1946 will be at an annual rate of about $27 billion. But in 1939 about 10.6 pct of total manufacturing payrolls were accounted for by unincorporated business. Even if we allow only about 9 pct for unincorporated business at the present time, the share of total payrolls properly attributable to corporations would be only about $24½ billion. A 21 pct increase on $24½ billion would be about $5.1 billion."

May I further call to your attention the fact that the $13.1 billion claimed by Blackett and Dalby to represent the cost of a 21 pct increase in hourly earnings implies a total production workers wage bill for manufacturing corporations in 1946 of $62.4 billion. Blackett and Dalby, therefore, have implicitly overestimated the corporate manufacturing wage bill for production workers by about $37.9 billion—an error of rather more than 150 pct.

OSCAR GASS
Robert R. Nathan Associates, Inc.
Washington

● The authors of the article referred to by Mr. Gass have the following comment to make on his letter.—Ed.: "We protest that Mr. Gass utilizes his own errors in reading as a basis for accusing us of errors in statements. We suggest that he read the article. In it he will find no assertion or implication that 'a 21 pct increase in hourly earnings of labor employed by manufacturing corporations at the 1946 level would raise *wage* costs by $13.1 billion.' Our article stated, 'At the 1946 production level a 21 pct increase in hourly earnings would have raised No. 1, the cost of goods sold, from $89 billion to $102.1 billion.' For one step in establishing these figures we made use of the relative changes in manufacturing payrolls.

"As a competent statistician Mr. Gass will be able to understand the use of a payroll index as an element in estimating total direct costs of manufacturing which are closely correlated with it. With ordinary care in reading it would not be possible to assume that the much larger cost totals so estimated are identical with the wage bill from which the payroll index was originally derived. 'A National Wage Policy for 1947' contends that total costs would rise only $5.1 billion in response to a rise of $5.1 billion in payrolls. As shown in our article an important fact is that wage costs are compounded in total cost of goods sold because of the multiplicity of manufacturing stages involved. After reading our article Mr. Gass will readily discover that his accusation, 'Blackett and Dalby, therefore, have . . . an error of rather more than 150 pct' is as wide of the mark as his opening statement."

SMALL DIAMETER SHAFTS

Sir:

We have a constantly recurring problem of turning comparatively small diameter shafts and pipe rolls. We are experiencing difficulty in keeping the chatter out of the finished product. These parts are machined between centers in an engine lathe. The shafts are generally 2¼ in. diam in the rough and range in length from 3 to 9 ft. The pipe rolls are usually made of 2-in. standard pipe with solid end inserts and also range from 3 to 9 ft in length. We are now proceeding in the conventional manner of spotting and setting up steady rests on work as required, however, a thought that one of our members advanced was a follower rest that would lead the tool. We would appreciate any suggestions or information you could give us on this particular job.

E. C. KRODESKA
Richmond Machine Co.
Philadelphia

● To get broader information, we sought the advice of a large machine tool company which has had experience in this type of work, and received the following information: The majority of this type of work where the diameters are straight is generally done with a follow rest of the plain jaw or roller type. However, in several instances we have furnished machines equipped with a box type cutter head carrying a multiple number of tools. With this type of head, all of the tools around the periphery of the head come in contact with the work and act as a steady rest as well as a cutter head. No doubt in the greatest number of uses of a lathe for this type of work a follow rest is used and most all lathes are equipped with this type of rest.—Ed.

METCO

Sir:

Will you please advise us whether you can furnish us any information regarding the metal Metco and its manufacturers?

JAMES E. POPE
President
Pope Trading Corp.
New York

● There are three products having the trade name of Metco: Metco metallizing equipment and wire, Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City, N. Y.; Metco roofing sheet metal products, Sheet Metal Mfg. Co., 953 Myrtle Ave., Brooklyn, N. Y., and Metco stainless steel ware, Metalite Mfg. Co., W. Washington Blvd., Los Angeles, Calif.—Ed.

ANOTHER 52-YEARER

Sir:

On the Dear Editor page of the Jan. 30 issue we note the letter by Cecil Alexander and in an endeavor to match his story, have been looking up and find that I have been a subscriber since 1893. Of course, at that time the *Hardware Trade Journal* was combined with THE IRON AGE. It is perhaps odd, but interesting, to note that Mr. Alexander studied the magazine at his father's home. One of my children learned to pick out pictures in the various advertisements, i. e., what they were, from looking at THE IRON AGE, before or just about the time he could talk, which was probably 53 years ago because he talked very young and is now 55. Since this date is a bit vague I would be willing to compromise for the 52 years which Mr. Alexander mentions. We are not giving up our subscription and hope to retain and enjoy it for a number of years to come.

JAMES A. EDEN
146 Chestnut St.
Springfield, Mass.

● We, too, hope you'll enjoy it for many years to come.—Ed.

AUSTENITIC NOT FERRITIC

Sir:

We wish to call your attention to an erroneous statement which occurs on the "Newsfront" page of your Nov. 21 issue. The alloy GT-45 to which you refer is not of the ferritic type but is of the austenitic chromium-nickel type containing molybdenum as well as several supplementary alloying elements. This product is still in the experimental stage of development. . . .

A. L. FEILD
Associate Director
Research Laboratories
American Rolling Mill Co.
Middletown, Ohio

RAILROADS

Sir:

I have read with great interest the article, "Railroads" by D. I. Brown, your Chicago Regional Editor, which appeared in the Jan. 2 issue. The article indicates deep thought and understanding of the subject. It is thought provoking and I am sure a great deal of good can come from it.

H. P. HASS
Director of Tests and Research
New York, New Haven and Hartford R. R. Co.
New Haven

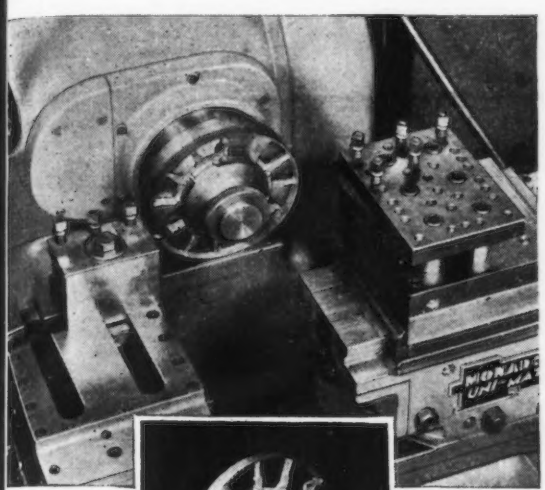
JOB EVALUATION SCALES

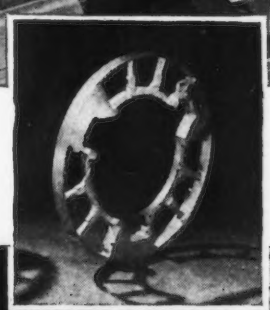
Sir:

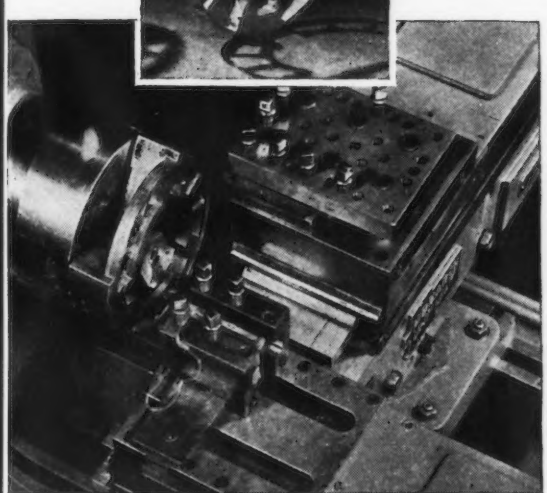
Will you kindly send me a reprint or copy of article, "Job Evaluation Scales," appearing in the Oct. 10 issue?

L. M. BARENBRUGGE
Methods Engineer
Chicago Metal Hose Corp.
Maywood, Ill.

3 Uni-matic Keys to Profitable Production...







1 NO TIME LOST CUTTING AIR

2 NO TIME LOST USING INEFFICIENT CUTTING SPEEDS

3 NO TIME LOST COMING UP TO SPEED OR STOPPING

Here's high-speed metal turning at its best!

The Uni-Matic is Monarch's new single-spindle automatic chucker—the machine that brings *peak production at a profit* within reach of every shop, no matter how large or how small the lots.

You can synchronize the independent motor-driven tool slides for simultaneous operation. Floor-to-floor time becomes little more than the time for the longest single cut. With a completely automatic cycle and rapid Uni-Mat traverse, there's no time lost traversing to or away from the work. Speed ranges are ample; speed changes quick—there's no excuse for using any but the most efficient cutting speed. And you can stop dead in *one second*, even with a spindle speed of 3,000 rpm.

When you want efficient, high-speed metal turning capacity, on parts as small as 1" and up to 16" diameter—plus universal adaptability to meet today's rising production costs—you'll want to investigate the Monarch Uni-Matic.

THE MONARCH MACHINE TOOL CO. · SIDNEY, OHIO

THE PART—Cash register key frame; cast iron, 6¼" O.D.

THE PRODUCTION FACTS—First operation—Face, bore and groove; time—1.00 minute. Second operation—Turn O.D. and face opposite side; time—1.10 minutes. Total time—2.10 minutes, including 20% fatigue factor.

For "peak production at a profit", get your copy of this new 36-page catalog on the Monarch Uni-Matic.

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

Industrial News Summary...

- ***Basic Metal Price Hikes Serious***
- ***Inflationary Tendencies Stronger***
- ***U. S. Steel Gives Foremen Bonuses***

FURTHER increases in basic metals this week featuring nonferrous metals, iron and steel scrap and pig iron, definitely point up an inflationary period outshadowed only by temporary periods during and shortly after World War I.

Pig iron prices this week were raised as much as $2.50, $3 and $4 a ton depending on the grade and the producer. Some makers advanced the price $3 a ton on all grades, others raised quotations $2.50 a ton on some types and $3 on others, while at least one pig iron producer advanced his prices $4 a ton. Some makers have not taken any action as yet but it is certain that they too will advance their quotations.

THE IRON AGE pig iron composite price this week moved from $30.15 a gross ton to $32.23 a gross ton, up $2.08 a ton. A further advance in the composite is expected next week after other makers take price action. In 1920 THE IRON AGE pig iron composite averaged $42.76 a gross ton with a peak of $47.83 a ton reached in July of that year. In 1939 the composite was $21.19 a ton and during the war years when controls were in effect the price of pig iron was $23.61.

THE iron and steel scrap market situation this week is in its most chaotic state in steelmaking history. Buyers and sellers alike appear to have lost their perspective and are openly admitting that scrap prices are entirely out of control.

The air is full of charges and counter-charges as to the responsibility for zooming prices. According to authoritative sources within the steel industry itself it is now privately admitted that the bitter competition for material at some distance from the steel mills has contributed primarily to the snowballing effect in higher prices. Some sources fear that quotations may go higher before a reaction sets in and point to the supporting factor of an anticipated high steel operating rate for some months to come.

As the result of a realistic policy in recognizing delivered prices of scrap to consumers regardless of the origin, practically all IRON AGE markets reflect higher scrap prices this week. The composite price, which is an average of Pittsburgh, Chicago and Philadelphia heavy melting scrap quotations, moved up this week from $34.08 a gross ton to $36.67 a gross ton, an advance of $2.59 a gross ton.

In June 1917 THE IRON AGE composite price for scrap hit $37.21 a gross ton and in other periods around that time, some isolated sales of heavy melting steel were made at close to $50 a ton. In 1939 the average price of scrap was $16.39 a ton and during the war the controlled price reflected a composite for steel scrap of $19.17 a ton. Actual payments during the latter period, however, were higher due to bringing scrap in from distant points.

NONFERROUS metals prices have reached new peaks with copper at 21.50¢ a lb, exceeded only by highs of nearly 24.00¢ a lb in 1929 and 1919, and 37.00¢ a lb in 1917. Lead at 15.00¢ a lb is at an all-time high, approached only in 1917 by the previous high of 12.25¢ a lb. Current prices for these metals have been forced up by the world shortage coupled with unprecedented world demand for reconstruction and civilian production.

There is evidence that current increases in these metals may be followed up by new price increases in other metals that are in a similar supply-demand position. Such increases may well be expected in tin, antimony, cadmium and perhaps zinc. The present copper price represents an increase of 49.6 pct over the last OPA-approved price effective until Nov. 10, 1946. The present lead price is increased 81.8 pct over the last OPA price.

With neither the U. S. Steel Corp. or the steel union having met this week to continue discussions on the expected wage increase, it is anticipated that both sides will make some headway when they sit down again next week to discuss economic factors in the coming wage agreement. Some steel and labor sources are pointing out that there is not too much time between now and Apr. 30 to reach an agreement. The slowness in making definite progress has caused apprehension to some companies whose contracts will follow the pattern of the U. S. Steel-USWA agreement.

THE U. S. Steel Corp. has approved a bonus of $250 for each of its 9500 foremen in the company's basic steel subsidiaries. This remuneration which amounts to $2,375,000 is already being distributed at some plants and is recognition for the supervisory assistance in the elimination of wage inequalities, a project which has extended over many months.

Steel ingot output this week is up one-half a point to 94.5 pct from last week's revised figure of 94 pct. Indications are that the rate next week will be unchanged. While raw steel output has not been affected by severe weather conditions, production of finished steel has been retarded at many points due to lack of gas. This coupled with freight car shortages has caused some consumers temporary production difficulties.

Steel demand this week continues strong and major steel companies are finding little change in the volume of backlogs. The tightness in flat-rolled items remains pronounced and there appears to be little chance of an easing in this category for some time.

• **MERCHANDISING PROBLEMS**—Robert E. Wood, Sears, Roebuck, & Co. board chairman, recently said that the only problem of merchandisers during the war years and during 1946 was the problem of getting goods. During the year 1945, Sears, he said, returned to its catalog consumers $150 million in cash, and in 1946, $250 million cash, for orders that they could not fill. "In the catalog business," he said, "we have an exact record, but the figures quoted do not include the figures we lost in our 600 retail stores, because we have no record in these stores. Supply is now beginning to catch up with demand and by the end of 1947, I believe the supplies will be adequate in most lines."

• **CANADIAN PRICE INCREASES**—Canadian Wartime Prices and Trade Board has announced price increases for domestically produced household electrical refrigerators, coal and wood ranges and heaters and warm air furnaces. The new price list for refrigerators went into effect Feb. 18 and for stoves and furnaces Feb. 20. The price increase to consumers has been limited to 10 pct on refrigerators, ranges and heaters and 7½ pct on furnaces.

• **WAA SALES TECHNIQUE**—Administrator Littlejohn of WAA has directed that there be initiated immediately a concentrated and directed sales effort by means of a series of conferences, personal calls, or other feasible methods to acquaint each purchasing officer for state and local governments with WAA sales procedures and methods. This action is intended to increase sales of surplus property to state and local governments.

• **TROOP CARS FOR SALE**—WAA is offering for sale at fixed prices nearly 2300 special troop sleeping and kitchen railroad cars. They were built for RFC at a total cost of $28 million and leased to the Pullman Co. during the war. On the list are 1894 sleepers—1177 at $2880 each and 717 at $3780 each. A unit price of $3240 is set for the kitchen cars. Many were designed for unrestricted freight or passenger operation and are described as being readily converted into box cars. Most of them are in storage at Iliopolis, Ill.

• **SCRAP COMPLAINTS**—In response to complaints that producers of housing items have not made every effort to obtain supplies of scrap, Presidential Assistant Steelman states that CPA will make intensive efforts through its production expediters to assist those who receive pig iron allocations to obtain maximum output through increased use of scrap.

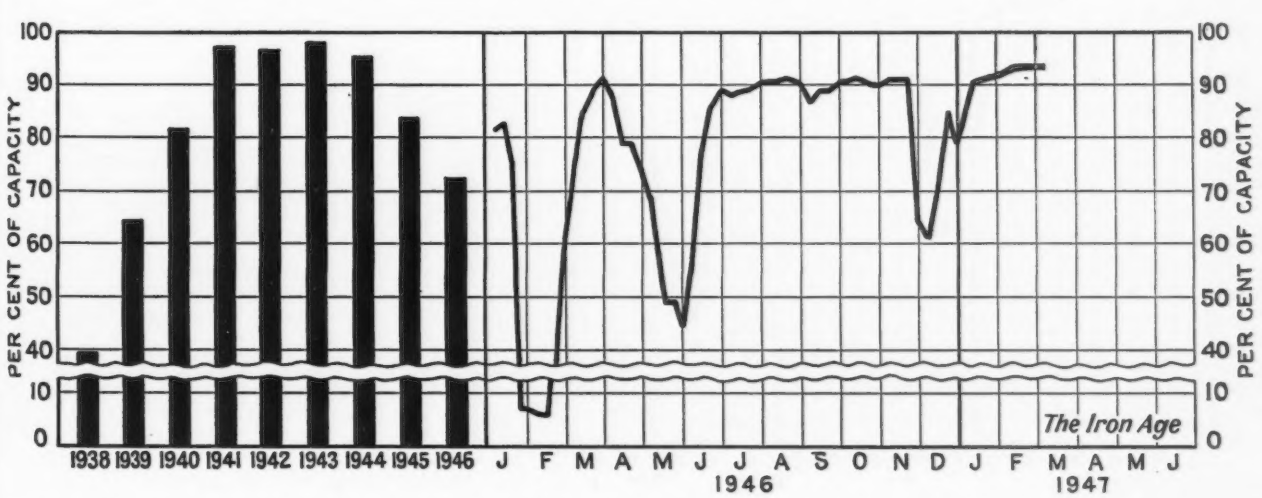
• **IRON ALLOCATIONS OUT**—Government allocation of pig iron for all items except cast iron soil pipe will end after Mar. 31. Continuation of the allocations for cast iron soil pipe was deemed necessary when it became apparent that a voluntary agreement between government and industry could not be reached. Pig iron producers have given assurance that producers of other critical housing items will be supplied adequate quantities of pig iron. Government allocation for the entire housing program for the past several quarters is estimated to have required 36 pct of the available supply.

• **POLISH STEEL**—War damage to openhearths in the former German territories of Upper Silesia, now Polish owned, is delaying steel production there but output reached about 11,000 tons monthly, about 20 pct of the prewar maximum, late last year in Upper Silesia. The metal consuming industry in the territory Poland has acquired from Germany now produces about 19 pct of the overall Polish output.

• **GEAR SALES**—The Gearing Industry, as represented by the members of the American Gear Manufacturers Assn., shows a decrease in volume of sales for January, 1947, as compared with December, 1946, of 17.6 pct. This report does not include turbine or propulsion gearing. The index figure for January, 1947, was 350.

• **TIRE OUTPUT**—Passenger car and motorcycle tire production hit 66 million in 1946, a new record. This was 136 pct above the 28 million units turned out in 1945 and more than 15 million units above the 1940 prewar record. The 15.8 million truck and bus tires produced in 1946 was three pct less than the 1945 record.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
February 25....	98.5*	92.5	91.0	90.0	96.0*	104.5	100.0	99.0	99.5*	103.5	103.0	76.5	95.0	94.0*
March 4.....	99.0	93.0	90.0	90.0	95.0	102.0	100.0	99.0	100.5	103.5	103.0	76.5	95.0	94.5

* Revised.

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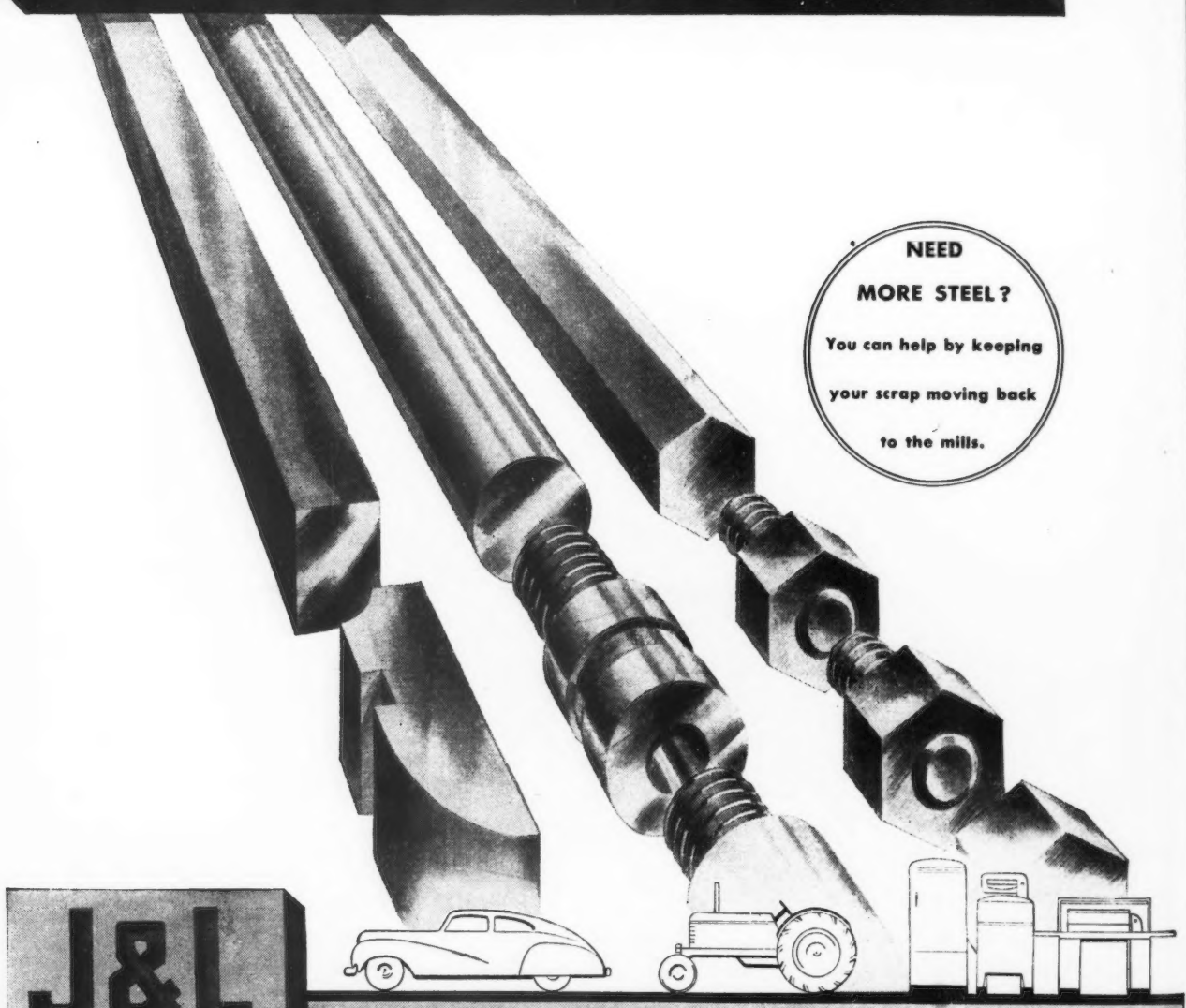

J&L STEEL

In addition to improved machinability and longer tool life obtained through use of J&L Cold Finished steel, many manufacturers specify this precision product for its improved surface finish. They also obtain in J&L cold drawn and cold rolled bars and special shapes the higher physical qualities needed for parts of modern high-speed machines. J&L engineers and metallurgists will be glad to assist you with your production problems. Write or phone your nearest J&L office.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH, PA.

Frenzied Steel Scrap Market Called "Out of Control"

Most Observers Believe Prices Will Go Even Higher Before A Reaction Sets In

o o o

By TOM CAMPBELL
News-Markets Editor

o o o

New York

• • • **The scrap market** situation today is in its most chaotic state in steelmaking history. Buyers and sellers alike have completely lost their perspective and openly admit that scrap prices are entirely "out of control."

The air is full of charges and counter-charges as to what started the skyrocketing in prices which began several weeks ago. According to authoritative sources within the steel industry itself, it is now privately admitted that the bitter competition for material in areas some distance from where the scrap was to be consumed contributed in a large measure to the snowballing effect in higher prices.

A check of responsible individuals both in the scrap industry and in steel circles indicates clearly that both sides are of the opinion that quotations may go much higher before a reaction sets in. Those same sources insist that efforts to pin the blame on any one group do nothing to help the situation. Furthermore, it is also admitted that tie-in sales in which scrap tonnages are promised in return for steel are continuing and have not been eliminated as some sources have stated.

While each individual steel company has exerted the utmost pressure on its customers to earmark their scrap for return to the steel mill, the cumulative effect of these individual actions has earmarked a great proportion of the production scrap now being made, or at least a major part of it. The effect of this situation, one scrap authority said, is that the amount of free scrap on which present market prices are obtained is constituting a smaller and smaller proportion of total scrap consumed.

With the total volume of free market scrap diminishing in relation to the total scrap utilized by the steel mills, the practice of some firms of attempting to maintain a lower local market while at the same time going to distant points and paying a much higher delivered price has upset completely the distribution of available dealers' scrap.

Already the dire effects of cross-hauling and bitter competition among steel companies have been realized—the distant markets have advanced to within a few dollars a ton of the so-called "local" markets in major centers. Such action, it is said, is obviously the result of consumers in those areas attempting to retain their normal scrap sources.

The absence of a free market during the war, one scrap authority says, created purchasing habits and distribution techniques far different than those prevalent in the prewar period. Many of the methods used today to obtain scrap are far different than in the period from 1936-39. However, scrap markets are so demoralized today and so sensitive to the slightest change in buying habits that brokers and dealers are even filling orders at $1 a ton above the price of the sale to the consumer in order not to be caught short.

According to reliable sources, some major scrap buyers have re-

Zoom!

written contracts when brokers have been unable to cover their requirements at the price dictated by the purchaser. In other instances some brokers declined to have their contracts rewritten because they felt that when and if the market started downward the purchaser might by the same token renege or ask for a change in his contract.

One slight ray of light in the confused picture, according to some sources, is the presence of what is said to be the 5 million tons of "potential" scrap in the form of machinery or unusable steel stocks now in the hands of the War Assets Administration. But before such material can be sold as scrap a strong selling job must be made on WAA which has been battered from pillar to post for its alleged inability to obtain a better recovery on its sale of government-owned surplus.

This so-called "potential" scrap is said to be in the form of machinery and equipment which it is assumed has no sale possibilities as prime material and the same condition is said to apply to some steel stocks, the physical and chemical characteristics of which do not make it applicable to peacetime use. Whether or not the steel industry and the scrap industry representatives will make possible a reservoir of scrap from WAA stocks remains to be seen.

Unimpeachable sources insist that the feeling of bitterness and retaliation between various steel scrap buyers is a real factor in the zooming prices. Some purchasers admittedly are going into territory long considered by other steel producers as their own. Such territorial assumptions are now out the window.

Pittsburgh, for instance, is getting what scrap sources estimate as two to two and a half times more scrap from the New York area than it got formerly. Material is also coming from the New Jersey markets, despite the fact that this area represents a more favorable source for eastern Pennsylvania mills because of lower freight rates.

As far as can be determined by survey and personal interview, scrap brokers are as much aghast at the current situation as are consumers. Brokers in turn have faced the same difficulties as consumers. Dealers have consistently raised their prices to brokers on the claim that the small peddlers have been forced to pay higher prices for collections because of the public's knowledge that prices have advanced.

With the steel industry and other private sources estimating that the current steel operating rate will be maintained for at least 4 to 5 months, the biggest worry scrapwise is not when prices will decline but how much higher will they go before the reaction sets in. **Old-time** scrap purchasers insist that the current market is on an entirely free basis and that some of the unusual gyrations have been caused by inept handling of scrap requirements. They say there is nothing in the picture which can be changed by congressional investigation or by name-calling.

Reports Gas Shortage In Pittsburgh Due To Increased Home Use

Pittsburgh

• • • **To ascertain the** facts concerning the present industrial gas shortage in the Pittsburgh district, the Pittsburgh Chamber of Commerce appointed a committee that studied the situation. The committee reported that the present shortage of industrial gas is due primarily to the increased domestic consumption, which through the Public Utility Commission of Pennsylvania regulations is given preference over industrial usage.

Despite the fact that gas could be available through the big inch from the south and southwest, there is every indication that such a supply would be a help but not a solution.

In the area served by the three main gas companies, Peoples Natural Gas Co., Manufacturers Light & Heat Co., and Equitable Gas Co., gas consumption in 1946 was 5 million cu ft greater than the peak war year 1943.

To show how gas consumption has increased in the area, the following figures are from the official files of the gas producers:

Year	Industrial Consumption Cu. Ft.	Domestic Consumption Cu. Ft.
1939	34,754,179,000	35,004,556,000
1943	66,160,473,000	41,327,694,000
1946	65,380,356,000	47,252,018,000

The figures for 1946 represent an increase of 12,247,462,000 cu ft over 1939 and 5,924,324,000 cu ft over 1943. Conversion to gas heating of homes is a move to conform with new smoke regulations in the area and also gas heating is desired by many home owners for its convenience. The gas companies and their suppliers have extensive development programs for 1947 and 1948, entailing expenditures of $49,200,000, but some of these plans are being held up because of material shortages, principally pipe.

SCRAP IS SCRAP: *"Swords into plowshares" was given a new twist recently when Bethlehem Pacific Coast Steel Corp. dumped about* 150 *tons of steel helmets into its San Francisco openhearths. (No, none of the war veterans in the plant found the helmets they wore overseas. Ed.)*

Steel for 10,000 Freight Cars Per Month Seen Assured

New Program Is to Supersede Current 7000 Car Set Up In Second Quarter

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Washington

• • • **With the announcement** by Senator Clyde A. Reed, R., Kan., that the steel industry has voluntarily agreed to supply sufficient steel to build 10,000 new freight cars monthly beginning in June, the "battle of the freight car shortage" appears to have been resolved in favor of Col. J. Monroe Johnson, ODT Director, who has consistently advocated a program of this size.

Several weeks ago Colonel Johnson told a Senate Subcommittee investigating the freight car shortage that he had been given assurances by the American Iron & Steel Institute that steel to build 10,000 cars monthly would be provided (THE IRON AGE, Feb. 13, p. 102). The subcommittee is headed by Senator Reed.

Senator Reed's statement came at the end of an all-day conference on Feb. 26 attended by representatives of 11 major producers, 8 railroad car builders, 18 railroads, and officials from the ICC, ODT, and CPA.

The 10,000 car program supersedes the 7000 car program already in effect. Since steel mill schedules have been arranged to provide sufficient steel for 7000 cars in April and May, increased deliveries to meet the new program are not expected until June. CPA and ODT say that a production rate of 10,000 cars monthly should be reached in July.

The program is entirely voluntary and will continue for an indefinite period. However, the steel industry's promises are predicated on the ability of car builders to obtain other necessary materials.

Preliminary estimates on steel requirements indicate that a maximum of about 175,000 tons will be needed for new production each month, and about 70,000 tons for repair of cars now laid up. Senator Reed told THE IRON AGE that the steel companies agreed to increase their steel shipments for repair in the same proportion that they are to be increased for new production.

Procurement difficulties are expected in sheets, plates, and bars, but the major bottlenecks are likely to be cast iron wheels and air brakes. Production of these latter products is directly affected by the shortage of scrap and pig iron. Meetings are being held in Washington in an effort to iron out these problems.

Distribution of steel for the program is being planned by a committee of car builders and railroad executives, and the CPA committee on steel distribution will work out the steel industry's part of the program. Much of this work will consist of recalculating upward present industry commitments for 7000 cars monthly.

While Senator Reed stated that steel would not have to be taken from other industries to support this program barring major strikes in the industry, government officials say this is inaccurate. The Senator also added that if it were not for the loss of production resulting from the coal and steel strikes last year this critical situation would not have arisen. The railroads' failure to order sufficient cars was also touched upon by the Senator, but he added that much of this was due to phony predictions from Washington economists who forecast a recession which did not happen.

The Kansas legislator, in a jubilant mood, told a press conference that when David Austin, vice-president, U. S. Steel Corp., stated that his company would supply their share of the necessary steel the other companies quickly fell in line. Other steel producers also represented at the meeting included the Bethlehem Steel Co., Jones & Laughlin Steel Corp., Youngstown Sheet & Tube Co., Republic Steel Corp., Wheeling Steel Co., Inland Steel Co., American Rolling Mill Co., National Steel Corp., Lukens Steel Co., and Worth Steel Co.

The following 11 companies, which have worked with CPA on the 7000 car program, will also participate in the new program: Colorado Fuel & Iron Corp., Central Iron & Steel Co., Alan Wood Steel Co., Phoenix Iron Co., Midvale Co., Crucible Steel Co., Granite City Steel Co., Laclede Steel Co., Kaiser Steel Co., Sheffield Steel Co., and the Wisconsin Steel Div., International Harvester Co.

A Change of Heart

Washington

• • • Terming the industry conference on the freight car shortage the most constructive day's work in "my long public career," Sen. C. A. Reed R, Kan., said that when David Austin, vice-president, U. S. Steel Corp., stated that his company would provide its share of the steel needed for freight cars, "it was the first time I almost kissed a vice-president of U. S. Steel."

Plans Southern Metal Show

Atlanta

"The Industrial South" will be the overall theme of the second Southern Machinery & Metals Exposition to be held in the Atlanta Municipal Auditorium, Apr. 14-17, according to R. S. Lynch, president of the exposition. The industrial forum to be held in conjunction with the exposition will further develop "The Industrial South" theme in stressing the ready markets that lie in this section of the country for southern manufacturers as well as for companies in other parts of the country producing equipment, parts, and material vital to the growth of southern industry.

The exposition will aid southern plants, manufacturing concerns and processing companies which are modernizing their operations or planning expansion programs or new installations. The latest equipment for these installations and the most modern ideas will be presented at the auditorium.

Warns That 1947 Tin Consumption Will Far Exceed Production

Washington

• • • **Warning that 1947** world tin production would fall far short of consumption, CPA has estimated in a summary that the 53,337 tons now in government stocks (exclusive of those held for stockpiling) will have been completely exhausted before the end of 1947.

Against consumption of 84,535 tons in 1945 and 80,386 tons in 1946, in addition to the government-held stocks, private stocks are estimated at 23,946 tons, a total of 77,925 tons.

The figure for government-held stocks, however, doesn't represent the amount available. Since a considerable amount of the government's 24,642 tons of concentrate is in working and in process stocks, the 1947 smelter production will be for the most part limited to intake of concentrates.

No forecast is made by CPA concerning the 1947 outlook for new supplies since the 1947 allocations have not yet been made by the Combined Tin Committee.

During 1946, the summary showed, U. S. tin stocks declined by 14,000 tons; with industry stocks already at minimum working levels, the entire drop was registered in government stocks.

CPA Estimates 53,337 Tons In Stocks Will Be Used Before Year's End

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By KARL RANNELLS
Washington Bureau

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New supplies during the past year were about the same as in 1945. Although imports rose about 2000 tons, this was offset by the decline in secondary supplies by the same amount. Some 6000 tons of metal and concentrates arrived from the Dutch East Indies, the first since the Japanese occupation in 1942. These were largely from stocks rather than new production.

Consumption of primary and secondary tin declined about 4000 tons over 1945 as a result of canceled war contracts and work stoppages, although consumption of pig tin declined only by about 2500 tons, the CPA summary indicated.

Lifting of controls in the last part of the year resulted in a higher consumption rate during the fourth quarter than the average for the year.

U. S. IMPORTS OF TIN BY COUNTRY OR ORIGIN

(Long Tons, 1945-1946)

1945	Concentrates	Metal	Total
Belgian Congo	7,401	6,494	13,895
Bolivia	25,984	0	25,984
China	0	1,946	1,946
French Cameroons	129	0	129
Other	15	973	986
Total	33,529	9,413	42,940
1946			
Belgian Congo	7,214	628	7,842
Bolivia	28,566	0	28,566
French Cameroons	58	0	58
Netherlands Indies	2,206	1,847	4,053
United Kingdom	0	4,208	4,208
Other	72	33	105
Total	38,116	6,716	44,832

CONSUMPTION OF TIN AND TIN IN ALLOYS

Long Tons, (1945-1946)

Classification	1945	1946
Tin and terneplate ..	27,390	27,051
Brass and Bronze	26,826	22,305
Solder	15,001	17,255
Babbitt	7,514	6,833
Tinning	2,815	2,230
Collapsible tubes	518	898
Foil	277	238
Type metal	1,021	1,378
Chemicals	131	118
Pipe and tubing	256	324
Other and unclassified	2,786	1,756
Total	84,535	80,386

U. S. TIN STOCKS, 1945-1947

(Long Tons of Tin Content)

DATE	GOV'T STOCKS			PRIVATE STOCKS			TOTAL
Jan. 1	Concentrate	Pig Tin	Total	Pig Tin	Other	Total	
1945	41,097	41,177	82,274	17,414	7,524	24,938	107,212
1946	32,536	35,490	68,026	14,951	8,646	23,597	91,623
1947	24,642	29,337	53,979	14,837	9,109	23,946	77,925

Figures on government pig tin includes 12,140 tons of Treasury and Navy reserve stocks not available for allocation but the 1947 figure excludes 9787 tons of Japanese tin brought here for processing and allocation by the Combined Tin Committee to all countries.

Dropped from Surplus List

Washington

• • • **All automobiles,** trucks and automotive parts and a large number of machinery items and building materials have been removed from the list of surplus goods which were permitted to be brought back from overseas under FLC Reg. 8, issued Jan. 14, 1946.

Effective Feb. 25, the action was announced by OWMR Commissioner Harold Stein after the original list had been reviewed by John R. Steelman, assistant to the president. Not affected are items which had been purchased by importers prior to the effective date of the new order and which are in transit before May 25.

Automatically exempt from the order are items that may be purchased by bid under the Canol Pipeline offering which comes under a special ruling.

Solicits Refractory Queries

Pittsburgh

• • • **A feature of the Refractories** Section Program for the annual American Foundrymen's convention to be held in Detroit the week of Apr. 17 will be a question and answer period, according to Richard H. Stone, Vesuvius Crucible Co., Pittsburgh 18, who will be chairman of the discussion.

The refractories committee is soliciting the active participation of those expecting to attend the session scheduled for 4:00 p.m., Tuesday, Apr. 29.

Questions regarding refractories or their use in any branch of foundry work are being sent in advance of the meeting to Mr. Stone.

Marine Radar On the Great Lakes

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Trial Units Gave Interesting Results in Rain and Fog During Past Season

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DOWN BOUND: *Entering the Lake Huron end of the St. Clair River is the 12,500-ton William G. Mather, flagship of the Cleveland-Cliffs Iron Co. The radar antenna can be seen on the port wing of the ship's bridge. The Blue Water Bridge in the background connects Port Huron, Mich., with Sarnia, Ont.*

Cleveland

• • • **Trials during the** past season with radar installations on Great Lakes cargo carriers indicate that such equipment may speed ore movement and reduce shipping hazards on these inland waterways. The tests were the result of a radar operational research project of the Great Lakes Carriers' Assn. on ships of six lines with as many different makes of radar equipment installed.

The trial installations were selected by a drawing of lots with the consulting engineering firm of Jansky & Bailey assisting in the planning and execution of the project. The vessels, listed in the attached table, are all bulk cargo freighters. The *Geo. F. Rand* is of the self-unloader type, while the rest are used primarily for carrying ore.

The *Wm. G. Mather*, with a total overall length of 618 ft, beam of 62 ft, depth of 32 ft, and gross tonnage of 13,500 tons, is typical of this fleet which travels at a speed of 11 to 13 land mph with a draft of approximately 22 ft. Some lake freighters are larger and some are smaller, but all require careful handling in a service where traffic is heavy and much of the time under way is close to shore, in channels, or entering and leaving port. Added to the normal hazards of converging channels and close-in navigation is the problem of fogs and inclement weather.

The captain of one radar equipped vessel kept a record of time saved by the use of his radar during the last two months of the past season. He had saved 40 hr of delay which at $100 per hr represented a $4000 saving. Based on ship to ship radio reports, this represents only that time when a non-radar equipped vessel in his vicinity would have been forced to drop anchor and wait for the fog to clear.

Results under conditions of rain squalls and snowstorms likewise were most interesting. Capt. A. J. Rathbun of the *Wm. G. Mather*, equipped with Westinghouse marine radar, reported his experiences on one such trip as follows:

"It was snowing hard. At times we could see the lights on the *Samuel Mather* but most of the time visibility was a mile and frequently much less. Our radar was working beautifully—as well as I had hoped for and much better than I had anticipated.

"We stayed in the pilot house all one night and spotted targets, "upbound ships," as soon as they came into the 8-mile range on the radar scope. Then by radio telephone I would warn the **Samuel Mather** and the **Pioneer** of their approach and could tell them exactly their angle of approach and distance away.

"About midnight I received a ship call from the Steamer *W. H. McGean*. The captain told me that the *McGean*, the *Farrell*, and some other ships were all down bound behind the *Pioneer*, that he had heard me give warnings to the other ships and requested me to do the same for them."

These trial installations, it is said, have shown that a well designed 3 cm wavelength marine radar is best suited to the navigational needs on the Great Lakes. Trials during the past season have demonstrated that such sets properly used and provided with means for receiving "Raymark" beacons should meet the navigational needs on these important inland waterways.

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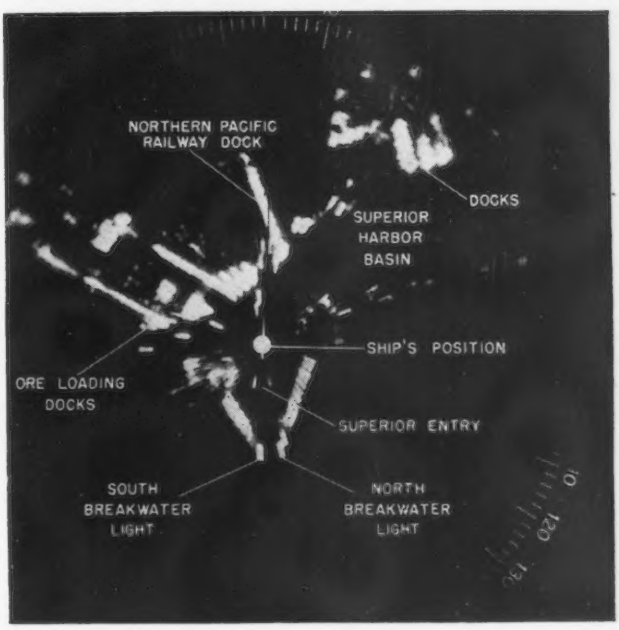

HARBOR SCENE: *This is what the radar observer sees inside the Superior harbor area with the scope set for 1½-mile range. The photo was made of the Westinghouse radar scope aboard the William G. Mather when she was inside the harbor area.*

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Undersecretary Outlines Industrial Mobilization Studies

Washington

• • • **Plans for industrial** mobilization by the Army and Navy Munitions Board, of which he is a member, were outlined to members of the Houston, Tex., Foreign Policy Assn. on March 3 by Undersecretary of War Kenneth C. Royall.

He pointed out that at the conclusion of World War II, the Army and Navy either owned directly—or they had sponsored 1200 complete manufacturing establishments devoted strictly to war production. These were in addition to the many private industrial plants which the Armed Services had helped equip and improve. Less than 100 of them, Undersecretary Royall said, are proposed for retention by the Army and Navy. The others are being released for disposal, some without restriction and some with such restrictions as it is believed will be acceptable to industry and will still preserve the plants for wartime production.

Similar arrangements, it was stated, are being made for reserves of machine tools and production equipment. It was explained, however, that a completely adequate reserve of plants and equipment would be too costly. Therefore, the Undersecretary said, it is necessary to look to the facilities of private industry for the bulk of possible war production.

Royall Hopes to Get Voluntary Action if Underground Plants Are Needed

° ° °

Available records now provide a splendid foundation for work in this field, it was declared, but every passing year and every new weapon or item of equipment will require a reexamination and revision of the list of earmarked plants. There must also be a change in the list of standby and restricted facilities, Mr. Royall said, in a continual effort to free plants for unrestricted business use as rapidly as circumstances permit.

"When we reflect that it took 20,000 industrial establishments to supply the major portion of the needs of the Armed forces in our last war—and that the Army alone used 1,600,000 different items of supply—we realize what a task it will be to maintain an up to the minute register of plants and their capabilities," said the Undersecretary. "But it must be done to the maximum extent possible."

Because in World War II serious shortages or lack of strategic materials hampered production of munitions, it was pointed out, Congress at the request of the Army and Navy has enacted a new stockpiling act under which it is hoped to acquire in a 5-year period stocks of such materials estimated to cost $2 billion.

There is also, it was stated, the possible increase of imports—or decrease of exports—of critical materials which might become scarce or unavailable if American national resources should be depleted. And, it was added, there is the problem of keeping alive the manufacture of war-originated substitutes which may require further development before they can compete with prewar materials.

One of the special problems was said to be that of underground and dispersion of plants.

"We are making a survey of the feasibility of using abandoned mines and natural caverns and are examining the cost of underground construction with conventional plant construction," Mr. Royall pointed out.

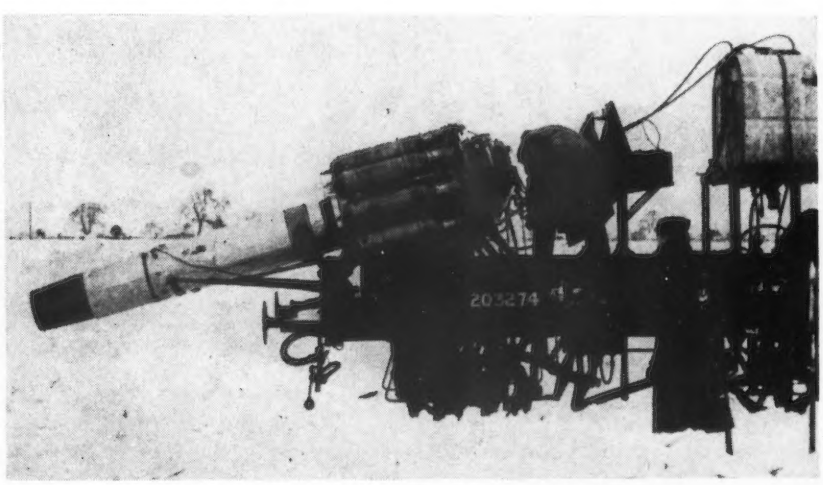
The Undersecretary said that industry will be advised of the facts and findings and at least for the present decision will be left to industry.

"Until shown otherwise," it was declared, "we will believe that, if dispersion and underground construction is a sensible course—for existing plants or for future construction—then that course is likely to be followed by far-sighted companies.

"But there are matters in which the selfish interests of particular industries will conflict with the requirements for sound industrial mobilization planning. Some companies will doubtless view with disfavor the necessary purchase abroad of stockpiling items, in spite of the fact that by its very nature the stockpile must principally consist of items in addition to those available in the United States. Others may oppose the easier import of certain materials or the restriction of their export.

"But it is gratifying to see, as our plans progress, how well and unselfishly our programs are received by industry as a whole, particularly by that part of industry which is progressive and far-sighted."

BRITAIN BURNS THROUGH: *In tests near Grantham, England, a jet engine mounted on a flat car pushed by a locomotive melts the snow in its path. The device has cleared drifts from 4½ to 18 ft deep. The British lack snowplows but not ingenuity.*



Weekly Gallup Polls . . .

Public Approves Truman's Appointment of Marshall

Princeton, N. J.

• • • **The American people** think retired Secretary of State James F. Byrnes did a good job while in office. They like the appointment of George C. Marshall to succeed Byrnes.

But, they do not want to see Mr. Marshall pursue a policy toward Russia less firm than the one followed by Mr. Byrnes. In fact, seven out of ten favor a policy as firm or firmer than that of Mr. Byrnes, according to George Gallup, director, American Institute of Public Opinion.

These are the facts emerging from a nationwide poll of voters' opinion.

The fact that a majority call for a firmer attitude toward Russia than that followed by Mr. Byrnes does not mean the American voter wants to provoke Russia.

A recent poll of the nation found nearly half of those with opinions saying they think this country should take steps to get along better with Russia.

It is just that a great many of the American voters apparently feel that one of the ways of getting along with Russia is to be very firm with her—that if we are firm, she will respect us.

The questions asked in the present poll:

(1) "Mr. Byrnes was Secretary of State for about a year. In dealing with foreign nations do you think that he did an excellent, good, fair, or poor job?"

It will undoubtedly please Mr. Byrnes that his rating is about as good among Republicans as among Democratic voters:

The results for the entire country:

	Pct.
Excellent	21
Good	36
Fair	17
Poor	6
No Opinion	20

	Democrats Pct.	Republicans Pct.
Excellent	25	20
Good	34	40
Fair	15	19
Poor	6	5
No Opinion	20	16

(2) "Do you approve or disapprove of President Truman's appointment of Gen. George Marshall as the new Secretary of State?"

The results for the entire country:

	Pct.
Approve	64
Disapprove	8
No Opinion	28

Mr. Marshall takes over his duties with good wishes from a majority of both Democrats and Republicans, as the following breakdown of replies shows:

	Democrats Pct.	Republicans Pct.
Approve	63	67
Disapprove	8	9
No Opinion	29	24

(3) "In dealing with Russia do you think that Mr. Marshall should follow Mr. Byrnes' policy, or should he be firmer with Russia than Mr. Byrnes was or easier?"

	Pct.
Follow Byrnes' Policy	19
Follow Firmer Policy	51
Follow Easier Policy	5
No Opinion	25

Republicans in the survey are more inclined than Democrats to want to see Mr. Marshall follow a course that is firmer than the Byrnes policy.

The difference in thinking is registered below:

	Democrats Pct.	Republicans Pct.
Follow Byrnes' Policy	20	20
Follow Firmer Policy	44	59
Folow Easier Policy	8	1
No Opinion	28	20

•

• • • **As legislative action** in the nation's capital this week advanced, the possibility of a presidential two-term amendment to the Constitution, returns from a poll of voters on the issue rolled into the institute's offices from all parts of the country.

Opinions were gathered by more than 250 field reporters in all major geographical areas, from voters in all walks of life—men and women, young, middle-aged, and old, professional, white-collar, manual workers, farmers, from voters in large towns and small.

And the consensus of voter opinion as reported on the birthday of George Washington, who established the two-terms precedent: All U. S. presidents should be allowed to serve no more than two terms in office; and the Constitution should be amended to that effect.

Voters Favor Placing Limit On Number of Terms for All U. S. Presidents and Senators

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Thinking on the issue has during the past 10 years split along political lines. It still splits that way. A majority of Republicans favor the amendment; a majority of Democrats oppose it.

However, many Republicans have modified their thinking since the death of Franklin D. Roosevelt, the only president to break the two-term precedent. Today, not so many of them want the amendment as did back in July 1944, when Mr. Roosevelt was about to launch his campaign for a fourth term in office.

The question used to measure sentiment on the issue today:

"Would you favor adding a law to the Constitution to prevent any president of the United States from serving more than two terms?"

The replies of those with opinion on the issue:

	Pct.
Favor	57
Oppose	43

Among those with opinions, majorities favoring the amendment are found in all parts of the country. The majority is particularly heavy in the heavily Republican West Central area, including North Dakota, South Dakota, Iowa, Kansas, Nebraska, Missouri, Wisconsin, and Minnesota.

This area, it should be noted, showed a majority in favor of the two-term limitation back in April 1943, when the nation as a whole was showing a majority opposed to the idea.

Here is the vote on the issue

(CONTINUED ON PAGE 170)

10,000 Government Purchase Specifications Now Being Revised

Federal Specifications Board Plans to Unify Thousands Within Next 5 Years

By GENE HARDY
Washington Bureau

Washington

• • • **Overhauling** of the existing 10,000 government purchase specifications is well under way. The goal set by the Federal Specifications Board is unification of about 5000 to 6000 of these specifications into Federal Specifications within 5 years. The writing of these specifications, binding on all federal departments, will eliminate many of the duplicating and overlapping specs now used by various agencies.

The mandatory character of Federal Specifications makes them doubly important to industry. Manufacturers and jobbers must be interested if they intend to supply their product to the government. In addition, these specifications are widely adopted by state and local governments and certain non-government bodies. While less than 2000 Federal Specifications were in effect last year, more than 650,000 copies of these were distributed to the various governmental units and almost 250,000 were sold to non-governmental activities. For example, a recent survey showed that in the city of Milwaukee, 38 pct of the specifications used by purchasing officials were Federal specs.

The Federal Specifications Board was created on Aug. 9, 1945, to unify specifications applicable throughout the government. This work was accelerated last year largely because of the revisions necessary due to wartime changes and the large number of non-uniform specifications that were in use throughout the government. In addition to the 1811 Federal Specifications on the books at the end of 1946, the following specs were being used by individual departments: Army 5693, Navy 1603, joint Army-Navy 376, and Bureau of Federal Supply 410.

Specifications for such things as naval vessels, ship propulsion machinery, and combat vehicles will never be unified, but the program applies to the hundreds of thousands of items used in government offices, shops, foundries, navy yards, and other establishments throughout the world.

The promulgation of Federal Specifications is aimed at "elimination of the unnecessary variations in the composition or physical qualities of metals and other commodities which are used by the various agencies of the government," according to Willis S. MacLeod, Deputy Director, Bureau of Federal Supply, in charge of standards. Mr. MacLeod also serves as executive vice-chairman of the Board. This Board, headed by Dr. Edward U. Condon, Director, National Bureau of Standards, is composed of representatives of ten government agencies, and was established by Clifton E. Mack, Director of the Bureau of Federal Supply, formerly the Treasury Procurement Division. The Board works with the Standards Branch of the Bureau of Federal Supply in a procedural and policy-making capacity.

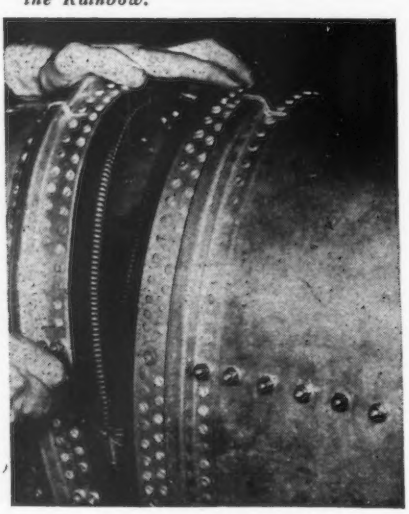
The actual drafting of Federal specs is performed by 77 specialized technical committees with a combined membership of approximately 1300 technical experts drawn from the government. Assisting each committee is a technologist from the Standards Branch of the Bureau of Federal Supply, an engineer whose specialty lies within the scope of the committee. The Board is also aided by an Industry Advisory Council, headed by Howard Coonley of the American Standards Assn. Its 12 members represent such industries as steel, electrical products, automotive, and chemicals.

The program got up full steam in mid-1946 when the Board announced that the writing of 718 new specifications; the revision of 442 specifications; and the amendment of 52 specifications had been assigned to the various technical committees. By the end of January of this year, these totals had increased to about 900 new, 450 revisions, and 100 amendments. Of this total, work had been completed on 42 new specifications, 38 revisions, and 30 amendments, as of Jan. 28.

The average time for completing a new specification is from 6 to 8 months. However, revisions and amendments, in many cases, are completed much faster. For example, work on an amendment to the specification for zinc-base alloy die castings was begun in August 1946 and was completed in October. An amendment to the specification for aluminum alloy (AL-52) bars, rods, shapes and wire was initiated in October and completed the following month.

The work is slow due to a variety of factors. The procedure for promulgating a new specification is painstaking and methodical. Members of the technical com-

SUPER ZIPPER: *Supercharger air ducts on the Republic XF-12, four-engine Army photographic plane are sectionally sealed by this B. F. Goodrich Pressure Sealing Zipper. Three of these zipper units are fitted to each of the supercharger ducts of the plane's 28-cylinder engines. The commercial version of the XF-12, a 4000-mile plane with speeds above 450 mph, is called the Rainbow.*



mittees are also determined to keep abreast of the many wartime innovations and developments. This is particularly true in regard to specifications for alloys, plastics, and lubricants and liquid fuels. In plastics, there are 17 new specs to be written. This technical committee has a tough problem in correlating and unifying test methods and determining whether requirements should be based on composition, performance or a combination of the two.

A new specification is prepared whenever there is sufficient demand for its use. Usually the request originates in the Board, the technical committees, or the Specifications Branch of the Bureau of Federal Supply. However, many requests also originate in the various government agencies and in industry. When the project is initiated by the Board it is turned over to the proper technical committee. This committee then goes over the existing information and makes tests, assisted by the Bureau of Standards. A draft is prepared and circulated through the government departments, producers of the commodity, technical societies and trade associations, and the Industry Advisory Council.

"The most important comment," says Mr. Mack, "is that of the producers. Industry can tell whether it can produce an article to meet the specification and if not, what can be furnished. We have received many valuable suggestions calling for minor changes which do not interfere with the use of the product yet permit commercial products to be furnished instead of special grades. Wherever that is done, the cost per unit is reduced materially."

It is also felt that in reviewing preliminary drafts, the manufacturers become well acquainted with the specification requirements with the result that their voluntary compliance is increased.

After revisions are made on the basis of comments received, the specification is sent to Mr. Mack, who has the final authority for approval. Once approved, the specification becomes applicable to all government purchases.

Copies of the specifications are available at the Government Printing Office, most of them costing only five cents. A Federal Specifications Index, listing all approved specs, may also be had.

SPECIFICATIONS WORK IN PROGRESS

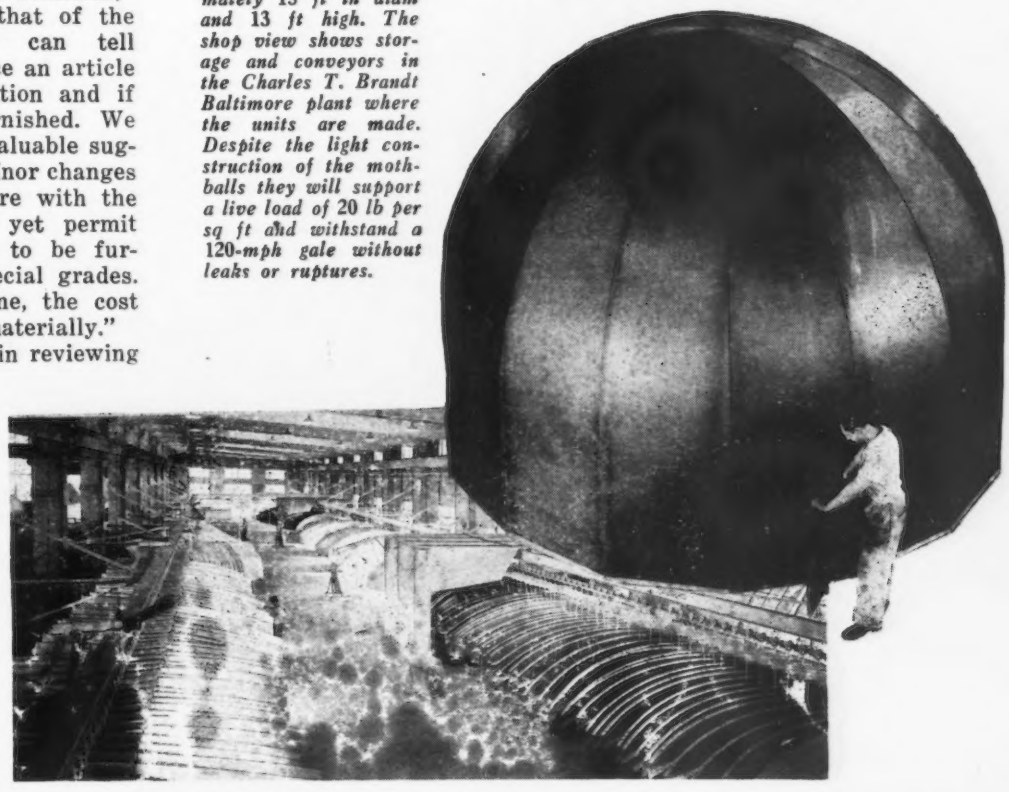
By the Technical Committee on Metals
(Jan. 28, 1947)

New Specifications

Aluminum alloy (4.5 Cu-1.0Si, Mn, Mg); plate and sheet clad.
Aluminum alloy (alloy 75); plate and sheet clad.
Aluminum alloy (alloy 75) plate and sheet.
Aluminum alloy; extruded shapes.
Aluminum and aluminum alloys; sheet (corrugated).
Aluminum; foil.
Anodic films; corrosion protective for aluminum alloys.
Bronze, bearing; castings, leaded.
Cadmium; anodes.
Copper; bus bars, rods and shapes.
***Fence-posts, gates, and accessories.**
Flux; brazing (silver-alloy).
Flux; welding (for aluminum and aluminum alloys).
Flux; welding (for magnesium alloys).
Fusible alloys; ingots and bars.
Magnesium alloy (1.5 Mn) plate and sheet.
Magnesium alloy (1.5 Mn) extruded bar, rod and shapes.
Magnesium alloy (3.0 Al, 1.03 Zn) plate and sheet.
Magnesium alloy (3.0 Al, 1.0 Zn); extruded bar, rod and shapes.
Magnesium alloy (5.0 Al, 1.02 Zn) plate and sheet.
Magnesium alloy (6.5 Al, 1.0 Zn.); extruded bar, rod and shapes.
Magnesium alloy (8.5 Al, 0.5 Zn.); extruded bar, rod and shapes.
Magnesium alloy; sand casting.
Nickel-chromium-iron alloy; welding rod.
Nickel-chromium-iron alloy; wire and wrought forms.
Rivets; tubular, cap, belt and burr (nonferrous).
Rods, welding; aluminum and aluminum base alloys (for gas and carbon-arc welding and aluminum brazing).
Steel, corrosion-resisting; sheets, corrugated.
Steel; machinery, cold-rolled, bars and rods.
Tubing; aluminum alloy, flexible.
Tubing; magnesium alloy (1.5 Mn) round, extruded.
Tubing; magnesium alloy (3.0 Al, 1.0 Zn), round, extruded.
Tubing; magnesium alloy (6.5 Al, 1.0 Zn), round, extruded.
Wire and ribbon; resistance.
Wire; copper, medium-hard-drawn.

(Continued on next page)

16-GAGE IGLOO: *A complete "mothball," right, used to protect naval 40-mm quadruple antiaircraft guns and mounts on laid up ships. The complete protective unit is made of orange peel shaped sections of 16-ga steel stampings, welded and bolted together to form an airtight igloo approximately 15 ft in diam and 13 ft high. The shop view shows storage and conveyors in the Charles T. Brandt Baltimore plant where the units are made. Despite the light construction of the mothballs they will support a live load of 20 lb per sq ft and withstand a 120-mph gale without leaks or ruptures.*



Revisions of Specifications

*Aluminum (alloy-2); plate and sheet.
Aluminum alloy (alloy-3) aluminum-magnesium; plates and sheets.
Aluminum alloy (alloy-24c2) (Al-Cu-Mg-1.5 Mn) plate and sheet, clad.
Aluminum alloy forgings; heat treated.
Aluminum alloy (alloy-24); plates, sheets and strips.
Aluminum base alloy; die castings (alloys-13X, 85, 85X, 218).
Aluminum-base-alloy; permanent mold castings.
Aluminum-base-alloys; sand castings.
Bronze, aluminum; bars and rods.
Hose, metallic; flexible, interlocking.
Rods, welding; copper and nickel-base alloys (for gas and carbon-arc welding).
Solder; soft (tin-lead and lead-silver).
*Terneplate; (for roofing).
Wire; brass.
Wire; copper; hard-drawn.
Wire; steel, spring, carbon and alloy (oil tempered and annealed).

Amendments to Specifications

*Aluminum alloy (alloy-52 (Al, Mn, Cr); bars, rods, shapes and wire.
*Brass, naval; bars, plates, rods, shapes, sheets and strips.
Bronze; ingots.
Bronze, phosphor; bars, plates, rods, shapes, sheets and strips.
Copper-silicon alloy; bars, plates, rods, shapes, sheets and strips.
*Lead; calking.
Steel; carbon (low-carbon) sheets and strips.
*Wire; copper, soft or annealed.
Wire, steel (carbon); spring, hand-drawn.
Wire, steel (carbon); spring, music.
*Zinc-base alloy; die castings.

*Work completed since July 31, 1946.

SPECIFICATIONS WORK IN PROGRESS

By a Selected Group of Technical Committees
(Jan. 28, 1947)

	New Specifications	Revisions of Specifications	Amendments to Specifications
Abrasives and Polishing Materials	5 (1)	1	2
Appliances	6	13	5 (1)
Builders and Misc. Hardware	7	7	1
Electrical Supplies	124	5	15 (2)
Fire-Alarms	4	2	0
Gages (Pressure and Vacuum)	1	0	0
Lubricants & Liquid Fuels	13 (1)	13	1 (1)
Machine - Screws, Bolts and Nuts	0	2	0
Materials Handling Equipment	18	1	0
Metals	34 (1)	14 (2)	7 (5)
Motals Vehicles	0	2	0
Pipe and Pipe Fittings	5	7	2 (1)
Plastics, Organic	17	2	0
Plumbing Fixtures	0	3	1 (1)
Refractory Materials	0	1 (1)	0
Safes, Fire and Petty Larceny	1	0	0
Safety Walkways	5	2	0
Safety Equipment	6	2	0
Storage Batteries and Dry Cells	0	2	1
Tableware and Kitchen Utensile	13 (1)	2	2 (1)
Tools	29	18	13 (2)
Weighing and Measuring Devices	3	1	1 (1)

Note: Figures in parentheses indicate the number of specifications completed in the various categories since July 31, 1946.

TIGHT FIT: *Enroute from Pittsburgh to the Gulf of Mexico, the AFDL-47, said to be the largest vessel ever launched on an inland river, is shown here as it was being maneuvered into the Dashields Locks in the Ohio River below Sewickley, Pa. Built by Dravo Corp., the huge floating drydock had a clearance of 6½ ft on either side as it passed through the lock.*

Protests Halt Geneva Freight Rate Cut For Month Pending Hearings

Washington

• • • **Suspension until** Mar. 31 of the proposed lower freight rates on iron and steel from Geneva, Utah, to the West Coast has been announced by the Interstate Commerce Commission. The new rates would have become effective Mar. 1.

The ICC announced that it would begin hearings in Washington on Mar. 11 on the suspension order which had been sought by competitors of the U. S. Steel Corp., owner of the former government steel plant at Geneva.

Under the proposed schedule, rates on a minimum shipment of 80,000 lb to Portland, San Francisco and Los Angeles would have been reduced from 70¢ per cwt to 48¢; to Seattle and Tacoma, from 76¢ per cwt to 54¢.

Protesting the proposed schedule were the Kaiser Co., Bethlehem Steel Corp., and the Colorado Fuel & Iron Corp., all with West Coast steel works.

In addition to Bethlehem, among East and Middle West producers who opposed the reduction in rates were Republic Steel Corp., Weirton Steel Co., Jones & Laughlin, and Youngstown Sheet & Tube Co.

The proposed rates would apply only to shipments over the Union Pacific, Western Pacific, Denver & Rio Grande Western, and the Bamberger Railroad. Neither the Sante Fe nor the Southern Pacific was to participate in the change.

Supporting the suspension move was the RFC, which is financially interested in the Kaiser plant at Fontana, Calif.; it fears that the rate reduction would adversely affect the Kaiser company's competitive position.

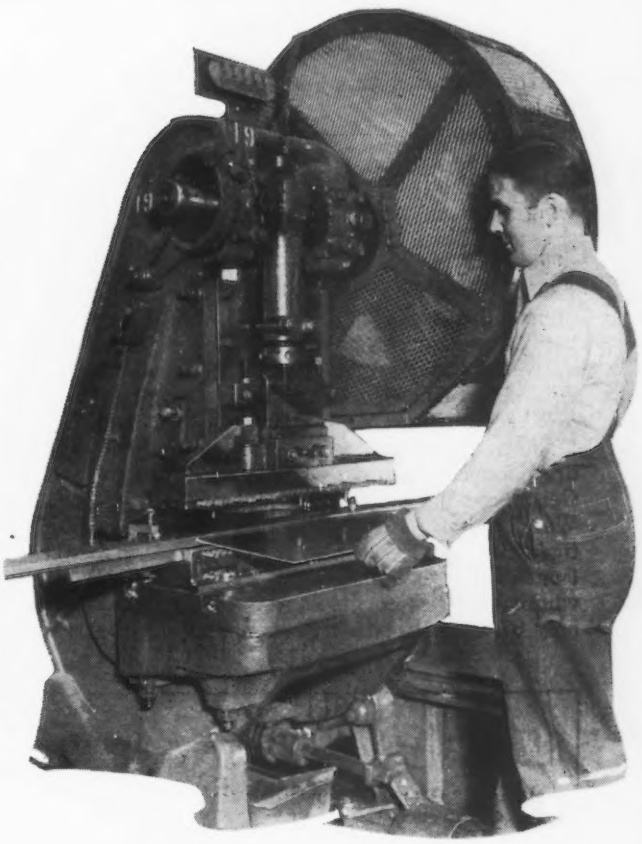
Monarch Machine Net Up

Sidney, Ohio

• • • **Monarch Machine Tool Co.** has reported 1946 net earnings of $678,476 after provision for federal income taxes. Net is equal to $3.23 a share compared with net earnings fkor 1945 of $560,266 or $2.66 a share. Gross sales in 1946 were $7,368,712 as compared with gross 1945 sales of $14,775,426.

Stamping Industry Initiates Program Featuring Cooperation with Schools

Industry Anxious to Provide Additional Training For Future Die-Makers



INDUSTRY CO-OPERATION: *The stamping industry has embarked on a plan to cooperate with schools by furnishing data and advice for courses involving die-making, die designing and other courses which are akin to the stamping of metal.*

New York

• • • **The stamping** industry with a view toward enlisting the interest of young men in making careers for themselves in the pressed metal field, is initiating a program of practical cooperation with vocational high schools and engineering colleges throughout the country. This program, auspices of the Pressed Metal Institute, is functioning in Toledo under the direction of the Toledo District, and is meeting with success there.

It was felt that keen competition from radar, electronics and other fields, widely publicized during the war, made necessary a constructive effort on the part of the stamping industry to inform students of the opportunities offered in the field of pressed metal.

The industry, it was said, is anxious to provide additional training for young men who are apprentice die designers. Realizing that at least one generation of replacements of die designers and toolmakers has been lost to the stamping industry, for various reasons, Walter T. Baird, chairman of the Toledo district of the Pressed Metal Institute appointed a committee to work out a plan whereby more and better tool and die makers could be speedily trained.

This committee consists of Ray Peterson, chairman (The Peterson Engineering Co.), Harold-W. Kost (Prestole Corp.) and Norman R. Thal (Inshield Products Co.) all of Toledo.

Early in December 1946 a meeting was held attended by these three men together with Walter T. Baird, Toledo Pressed Steel Co.; Tom J. Smith, Jr., executive vice-president, Pressed Metal Institute; Wilfred Williams, Acklin Stamping Co., and Dean John Brandberry and Professor Ivan Zarobsky of the University of Toledo and F. M. Dannenfelser, principal, and W. T. Scott of the Macomber Vocational High School.

The Macomber School for several years has included in its curriculum a course for diemaking apprentices. Boys in this course are paired, each boy working alternately for two weeks in some plant die room and then two weeks in school. In this way the apprentices obtain both a good theoretical and practical background and the company has a boy continuously in their plant.

This school also provides a night class for diemaker apprentices. These apprentices can attend classes in the Macomber high school at night 4 hr a week. This, it is said, gives the man an opportunity to work all day in the shop and secure his theoretical knowledge in the evening.

Representatives of this school however, welcomed the offer of assistance by the stamping industry in order that their course in diemaking would be of the greatest value to the student and to the stamping industry.

Representatives of the University of Toledo were said to have received with open arms assistance from the pressed metal industry in the training of their students. They recognized the limitations of their present text books and the fact that technological advances in stamping technique have been so rapid in recent years that they have not been able to keep abreast of developments.

The immediate result of this joint cooperative movement has been the organizing at the Toledo University of a new class in die design. The first session of this class was held on Feb. 6 with seventeen men enrolled.

This enrollment is divided as follows: About half are die designers in various stages of learning, from Toledo stamping plants, one-quarter from regular university students specializing in tool engineering who are taking the course to obtain additional background information with the possibility of going into the stamping field, the final one-quarter are men who have shop and drafting background and who want to break into the die designing field.

Raymond Peterson owner, the

Peterson Engineering Co. and a former instructor at the university in mechanical engineering has been drafted to teach this class in die-making.

The members of the Toledo district of the Pressed Metal Institute are furnishing necessary millwrights to set up and get running a press at the university. They will also supply some of their obsolete dies for use in this press by students. Plant visitations will be arranged and competent men from the stamping industry will address the class from time to time.

The shortage of expert toolmakers in this country has been dramatized by pointing out that in Germany at the beginning of World War II there were 225,000 expert toolmakers in relation to a population of approximately 65 million whereas in this country there were only 87,000 in relation to a population of over 130 million.

The stamping industry recognizes the desirability of selling industry in general and the pressed metal industry in particular to schools and to students. Therefore the Toledo district of the Pressed Metal Institute expects to conduct a series of educational talks, arrange talks before classes by key industry leaders, and use anything else of an inspirational nature to young men students to encourage them to fit themselves for places in industry.

They will point out that in the stamping industry management-men are most frequently selected from toolmakers and although toolmaker and die designer apprentices may receive as an apprentice a lower hourly rate than journeymen press operators their opportunity for future advancement is much greater.

Active interest in an advanced educational program is evidenced by the response to a recent survey conducted by the national educational committee of the Pressed Metal Institute among colleges having engineering courses. Fifty-four out of 73 such institutions stated that metal stamping methods for mass production has become an accepted subject for class discussion.

One or more presses for demonstration are installed in 15 colleges. Educational aids most frequently requested by 51 colleges included films, literature, samples, equipment, course outlines and technical data.

The educational committee is continuing their study as to how best the stamping industry can cooperate with engineering colleges and vocational high schools and expect to shortly develop specific plans for use by members and district groups of the Pressed Metal Institute in conjunction with vocational high schools and engineering colleges in this vicinity.

Coming Events

Mar. 17 American Institute of Mining & Metallurgical Engineers, world conference on mineral resources, New York.
Mar. 17-19 American Society of Lubrication Engineers, annual meeting, Pittsburgh.
Mar. 17-19 American Gas Assn., sales conference, Boston.
Mar. 17-19 Chicago Technical Societies Council, production conference, Chicago.
Mar. 19-22 American Society of Tool Engineers, annual meeting, Houston.
Mar. 19-22 National Screw Machine Products Assn., annual meeting, Cleveland.
Mar. 22-27 Western Metal Conference and Exposition, American Society for Metals, Oakland, Calif.
Mar. 24-25 American Machine Tool Distributors' Assn., spring meeting, Chicago.
Mar. 31-Apr. 2 Midwest Power Conference, Chicago.
Apr. 7 Packaging Machinery Manufacturers Institute, semiannual meeting, Philadelphia.
Apr. 7-10 National Assn. of Corrosion Engineers, convention, Chicago.
Apr. 8-11 American Management Assn., packaging exposition, Philadelphia.
Apr. 14-16 National Machine Tool Builders' Assn., spring meeting, Atlantic City, N. J.
Apr. 14-17 Electrochemical Society, Inc., Columbus, Ohio.
Apr. 14-17 Southern Machinery & Metals Exposition, Atlanta.
Apr. 28-29 American Zinc Institute, annual meeting, St. Louis.
Apr. 28-May 1 American Foundrymen's Assn., convention, Detroit.
Apr. 29-May 1 Industrial Packaging and Materials Handling Exposition, Industrial Packaging Engineers Assn. of America, Chicago.
May 5-6 National Welding Supply Assn., convention, Philadelphia.
May 6-10 Society of the Plastics Industry, Inc., exposition, Chicago.
May 15-17 Society for Experimental Stress Analysis, annual meeting, Chicago.
May 26-27 American Iron & Steel Engineers, annual spring conference, Philadelphia.
May 27 Metal Powder Assn., spring meeting, New York.
June 9-11 American Coke & Chemical Institute, annual meeting, French Lick, Ind.
June 16-20 American Society for Testing Materials, annual meeting, Atlantic City, N. J.
June 17-19 Machinery Dealers National Assn., convention, Cincinnati.
June 23-27 American Electro Platers Society, industrial finishing show, Detroit.

AFA Birmingham Group Holds Annual Conference

Birmingham

• • • **With the president** of the national organization one of the speakers, more than 500 representatives of the industry attended the 15th annual Foundry Practice Conference of the Birmingham District Chapter, American Foundrymen's Assn., held here Feb. 20, 21 and 22.

The president, S. V. Wood, president and general manager, Minneapolis Electric Steel Castings Co., Minneapolis, discussed growth and activities of the A.F.A.

Other speakers and their subjects included: L. D. Pridmore, vice-president, International Molding Machine Co., Chicago, "Core Blowing Equipment;" John P. Sellas, sales manager, Precision Castings Div., Michigan Steel Castings Co., Detroit, "Precision Castings;" Raymond Foster, assistant metallurgist, Lynchburg Foundry Co., Lynchburg, Va., "Foundry Sands;" F. G. Sefing, development and research division, International Nickel Co., New York, "Some Alloy Irons for Wear and Corrosion Resistance," and W. B. McFerrin, Electro-Metallurgical Co., Detroit, "Cupola Melting of Gray Iron."

The London ECONOMIST

The Chances of Freer Trade

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

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"TO be fully effective, general rules for international commercial and trade relations such as those laid down in the Suggested Charter (for the International Trade Organization) must be supplemented by specific action to reduce, modify or eliminate barriers to trade such as tariffs, quantitative restrictions and discriminations."

This sentence is from the Acting Secretary of State's announcement of negotiations for trade agreements with 18 other countries, made on Nov. 9 last. Evidence is gradually accumulating of the extent to which this thesis has support in a country that has just returned a Republican majority to Congress.

The record of the efforts that the Truman administration has made in the course of the last 2 years under multilateral world trade is impressive. The Reciprocal Trade Agreements Act was renewed in July 1945, for a further 3 years; under it, the President has power to reduce any American tariff by as much as half of the rate prevailing on Jan. 1, 1945. The initiatives and invitations of the State Dept. have been mainly responsible for summoning the Preparatory Conference which met in London last September and the subsequent meeting that is to be held in Geneva in April.

As part of the American preparation for this meeting, the Committee for Reciprocity Information is now holding hearings to get the views of individuals, firms and trade associations interested in items on the published list of commodities whose status may be affected by the forthcoming bargaining on rates.

The Committee includes members from the Tariff Commission, and the Departments of State, Treasury, War, Navy, Agriculture and Commerce. Following a general session for members of Congress and general representatives five panels for special classes of commodities are now sitting separately to hear some 850 spokesmen for such varied products as coal, coffee, apples, razor blades, lace, honey, castor oil, spangles and canaries.

What they say follows patterns thoroughly familiar through the 12 years that the Reciprocal Trade Agreements Act has been in operation. In the opening round, the representative of the American Tariff League is heard; so is the representative of the National Foreign Trade Council.

This time, the Tariff League's case is a reaffirmation of the belief that tariff rates should be determined domestically (that is, by Congress rather than by negotiations conducted by the President with foreign powers); that chaotic world conditions make this an inappropriate time for reducing U.S. tariffs and a time when foreign nations will give little in return; that recent foreign loans have pyramided abnormal exports on top of normal exports to such an extent that if there were to be an increase in imports sufficient to balance both, it would be so large as certainly to displace goods of American producers.

Industries needing tariff protection are not necessarily inefficient; some cannot mechanize entirely and some have a high proportion of labor costs. A diversified economy serves the general welfare and the national security; a flexible, equitable tariff is sound.

IN SPECIFIC support of this line of reasoning, some communities come to the hearings in a body; from Gloucester, Mass., come representatives of the Chamber of Commerce, the Fisheries Assn, the Fishing Vessel Owners Assn, the Sea Food Workers Union, the Building and Construction Trades Council, the Central Labor Union, the Gordon-Pew Fisheries Co., Ltd., Davis Bros., Fisheries, Inc., and Solomon Sandler, with the mayor at their head, all demanding to be heard on fish. The representatives of individual industries have a largely unvarying purpose, to meet the general aim of reciprocal reduction of rates with the specific cry; But not ours!

There are some understandable exceptions: Producers of ethyl gasoline see no harm in facilitating imports of lead; producers of zinc hold that zinc ores should be encouraged though obviously not the finished product. The Aluminum Assn. welcomes the arrival of bauxite ores but not of aluminum, while the bauxite producers protest. Makers of chocolate bars are free traders on sugar, cocoa beans, and Near East almonds, but not on their combination of the three.

Because of the large number of parties to the negotiation that is to take place in April, the official list of negotiable articles is a long one; and so, accordingly, is the list of firms filing protests.

Even though each firm is interested in only one product—or at most a small group of products—the political effect of their multiple protests is cumulative. Those in charge of the Reciprocal Trade Agreements program doubtless weighed the loss of time that would have occurred if the series of agreements had been spaced, and concluded that the benefits of a quickly concluded multiple negotiation were worth the domestic risk of hearing all the opposition at once.

But the present demonstration of the political axiom that those in favor of a program are apt to be silent partners, while those opposed say "No" at the top of their lungs, may be about to cause the administration some difficulties.

IT is true that there are more than three score organizations interested in the expansion of American foreign trade: Important among them are the National Foreign Trade Council, the U. S. Associates, the China-America Council, the Council for Inter-American Co-

(CONTINUED ON PAGE 171)

Government Industrial Stand-By Plants Now Offered for Lease

Washington

• • • **Originally designed** for the production of munitions and chemicals but equipped for manufacturing, production line assembly and warehousing, Army engineers are offering for lease to private industry portions of 31 government-owned industrial stand-by plants which are scattered over 17 states.

Present facilities include equipment for the manufacture of such products as glass-lined, stainless steel, high chrome iron and steel batching equipment. Among the many uses to which these plants can be converted, according to the War Dept., is the manufacture of metal and alloy products, electronic equipment and electrical appliances and accessories.

The commanding officers of these plants which are listed below will be able to furnish detailed information:

Iowa Ordnance Plant, Burlington, Iowa; Sunflower Ordnance Works, Eudora, Kan.; Kansas Ordnance Plant, Parsons, Kan.; Nebraska Ordnance Plant, Mead, Neb.; Rocky Mountain Arsenal, Denver; Holston Ordnance Works, Kingsport, Tenn.; Milan Ordnance Center, Milan, Tenn.; Alabama Ordnance Works, Sylacauga, Ala.; Volunteer Ordnance Works, Tyner, Tenn.; Huntsville Arsenal, Huntsville, Ala.; Redstone Arsenal, Huntsville; Cherokee Ordnance Works, Danville, Pa.; Radford Ordnance Works, Radford, Va.; New River Ordnance Plant, Pulaski, Va.; Edgewood Arsenal, Edgewood, Md.; Morgantown Ordnance Works, Morgantown, W. Va.; Indiana Ordnance Works, Charlestown, Ind.; Ravenna Ordnance Plant, Apco, Portage County, Ohio; Wabash River Ordnance Works, Clinton, Ind.; Jefferson Proving Grounds, Madison, Ind.; Maumelle Ordnance Works, Marche, Ark.; Lone Star Ordnance Plant, Texarkana, Tex.; Louisiana Ordnance Plant, Minden, La.; Longhorn Ordnance Works, Karnack, Tex.; Pine Bluff Arsenal, Pine Bluff, Ark.; Dickson Gun Plant, Houston; Badger Ordnance Works, Baraboo, Wis.; Elwood Ordnance Plant, Joliet, Ill.; Kankakee Ordnance Works, Joliet; Kingsbury Ordnance Plant, La Porte, Ind.; Hoosier Ordnance Plant, Charlestown, Ind.

Steel Pipe Delivered to Egypt by Airplane

Pittsburgh

• • • **An Egypt-bound** transport plane recently took off from the Pittsburgh airport carrying the largest shipment of tubular steel pipe ever made to such a distant spot by air. The tubing was urgently needed to repair a Suez, Egypt, petroleum refinery cracking-still owned by the Anglo-Egyptian Oil Fields, Ltd. Work was at a standstill until the arrival of the tubing, with air freight, used because of the time element, shipping cost exceeded the actual cost of the pipe by a ratio of over 6 to 1. Pittsburgh Steel Co. expedited production to fulfill this order and called on the Contract Air Cargo Div. of American Airlines to transport the tubing to the Egyptian refinery. The finished pipe was delivered by truck to the airport in the morning. It consisted of 7 tons of externally upset cracking-still chrome-moly tubing, each tube 30 ft long, 5-in. OD.

A BELLYFULL: *Seven tons of pipe for an Egyptian refinery are strapped down in a DC-4 in preparation for the 7400 mile sortie to Suez. Left to right, Robert Drushell, American Airlines; John Casey, manager of the airline's air cargo engineering; Elio Checchi, Pittsburgh Steel Co.; and Floyd E. Lee, American Airlines, who is flight engineer for the trip.*

In about 2 hr the tubing was loaded on the plane and specially braced to prevent it from shifting during the 7400-mile flight.

Shortly before noon, the pilot, Capt. Ernie Dryer, who is one of the oldest pilots in the business and one of the few with over 2 million flying miles, took the plane off and headed for New York. There, an additional 500 lb of cargo was taken aboard and the haul continued to Suez, Egypt, by way of Ganda, Newfoundland; Shannon, Ireland; and Rome, Italy. The complete trip took about 33 hr flying time, with elapsed time totalling about 50 hr.

On the return trip, this same plane and crew are to stop at the Isle of Jersey and take on a load of pure bred cows. The cattle are to be delivered to Newark, N. J., for breeding purposes. Stalls for the cattle were carried on the Egypt flight.

Annual Report Tells Of Bethlehem's Plans For Foreign Ore Supplies

New York

• • • **Bethlehem Steel Corp.** produced 10,012,480 net tons of steel in 1946, operating at 77.6 pct of rated capacity, the company's 1946 annual report shows. This is 15 pct less than the 1945 figure. 11,831,610 tons, when the Bethlehem companies operated at 91.7 pct of rated capacity.

Net income was $41,731,931, including a strike induced transfer of $11 million from reserve to second quarter income. This compares with a $34,947,116 net in 1945. Strikes and the scrap shortage prevented full capacity operations last year, the report states.

New construction projects of the company will cost $162,500,000. Included is a $37.5 million item for development of iron ore properties and allied equipment. In line with this program, the corporation put into service in 1946 three new ore carrying vessels, each of 24,000 dwt capacity. Four similar ships are due this year. By 1948 Bethlehem expects to be getting heavy shipments of foreign ore.

Eight general cargo vessels, replacing ships lost or requisitioned during the war, have been or will be acquired in 1947, and will be used primarily to carry iron and steel products from Atlantic to West Coast ports.

Plant expansion and improvements completed during 1946 or authorized at the end of that year are as follows:

Bethlehem

Facilities for additional tool steel capacity; added facilities for roll hardening and finishing added equipment at ingot mold foundry.

Steelton

Fabricating shop extension (Steelton Div.); added wire rope equipment (Williamsport Div.).

Sparrows Point

Battery of coke ovens; one blast furnace two openhearths; four soaking pits; added equipment for finishing tinplate; additional wire rod and finished wire capacity; electric power station.

Lackawanna

Additional finishing facilities at 14-in. bar and structural mill; improvements to the 79-in. continuous sheet and strip mill.

Johnstown

Battery of coke ovens; ore sintering unit; steam generator; new power station; cleaning equipment for blast furnace gas.

Los Angeles

Wire production equipment; added scrap preparation equipment; warehouse and office building (in Los Angeles).

South San Francisco

New warehouse.

Fairfield

Facilities for reclaiming scrap and fabricating small steel tanks.

Tulsa

Office building.

Corsicana, Tex.

New machine shop for making oil well drilling equipment.

Premium Bonuses On Nails to Be Allowed To Expire on Mar. 31

Washington

• • • **Premium payments** on housing nails will be allowed to expire on Mar. 31, the original termination date, leaving but two of the original 11 bonus plans in effect under the housing program.

These are for pig iron and cast iron soil pipe, both of which are scheduled to expire June 30. However, Housing Expediter Frank R Creedon says these can and will be extended if it is indicated that housing would suffer by their termination.

Nail shipments increased from 63,000 tons in September to a new postwar high of 78,500 tons in December, Mr. Creedon said, to bring the total for 1946 to 662,000 tons. The CPA forecast for 1947 is 800,000 tons or better.

Although the 1946 production of cast iron soil pipe was approximately double that of 1945 (and almost the 1939 rate), a shortage of pig iron caused December production to decline 8 pct, bringing the year's output to 403,000 tons.

Soil pipe is construction's most serious problem, the housing expediter said. Requirements for 1947 are currently estimated by CPA to be about 500,000 tons while there is believed to be an additional 100,000 tons needed to provide for deferred installations carried over from 1946.

BLAST FURNACE OUTPUT UP: *Blast furnace output for January gained sharply over December, the month during which the coal strike cut sharply into production. In pig iron the gain was* 1,071,015 *tons over December's* 3,943,781 *tons. Ferromanganese and spiegel output was up* 8,189 *tons above the December figure of* 48,384 *tons, according to American Iron & Steel Institute figures.*

Blast Furnace Capacity and Production—Net Tons

	Number of Companies	Annual Blast Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL		Pct of Capacity	
			January	Year to Date	January	Year to Date	January	Year to Date	January	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	11	12,551,280	937,150	.....	26,326	.....	963,476	.....	90.3	.....
Pittsburgh-Youngstown	16	25,042,040	1,980,342	.....	19,620	.....	1,999,962	.....	94.0	.....
Cleveland-Detroit	6	6,557,500	522,248	.....	.....	.....	522,248	.....	93.7	.....
Chicago	7	14,097,710	1,051,846	.....	.....	.....	1,051,846	.....	87.8	.....
Southern	8	4,924,670	353,904	.....	9,644	.....	363,548	.....	86.9	.....
Western	4	2,536,000	169,306	.....	983	.....	170,289	.....	79.0	.....
Total	36	65,709,200	5,014,796	.....	56,573	.....	5,071,369	.....	90.8	.....

Source: American Iron & Steel Institute

Industrial Briefs . . .

• TO BUILD ENGINES—Kaiser-Frazer Corp. has announced that it will build its own engines in Continental Motors' Detroit plant under a lease arrangement. E. J. Hunt will be in charge. This will be effective Mar. 2 and will run for 5 years. The plant has a designed capacity of 1000 a day.

• DISSOLVES PARTNERSHIP—The partnership existing between Joseph J. Hession and Elmer E. Nicholson, trading under the name of Tacony Tool & Machine Co., Philadelphia, has been dissolved by mutual consent.

• LURIA PROJECT—Luria Engineering Corp. reports that it has now put fabrication of its standard factory buildings on a production line basis by designing their parts so as to permit a considerable interchangeability between members and between different types of buildings. The company, whose background includes production of airport hangars and utility buildings, is now constructing standard factory buildings in widths from 40 ft to 100 ft with lengths adjustable in 20-ft increments.

• ADDS FLOOR SPACE — Morrison Steel Products, Inc., Buffalo has announced plans to add 56,000 sq ft to manufacturing space and increase employment from 500 to 750 this year. About 50 pct of present manufacturing capacity is devoted to warm-air furnace production.

• BRYANT REPRESENTATIVES — Bryant Heater Co., Cleveland, has appointed two new representatives for its gas-fired heating equipment line: Philip W. McCoy has established the Bryant-McCoy Co. in Jamestown, N. Y. and Paul J. Schaack has established the Bryant-Schaack Co. in Clearwater, Fla.

• WAA LARGEST SALE—Largest sale reported by the Cleveland office of War Assets Administration during January was the acquisition of 49,184 ft. of seamless steel tubing for $45,249 by the Standard Oil Field Supply Co., Houston.

• NEW PLANT PLANNED — The Yale & Towne Mfg. Co. has announced that a contract has been awarded to the Turner Construction Co. for the erection of a new plant in Philadelphia of more than 600,000 sq ft on a 93-acre plot. The plant will produce various hoists, hand lift trucks, electric trucks, cranes, etc.

• MOVES DISTRICT OFFICE — American Welding & Mfg. Co., Warren, Ohio, has transferred its Cleveland district sales offices from Warren to Cleveland, H. R. Ormerod, district sales manager, will continue direction of activities in the district.

• YODER PLANS TO BUILD—Yoder Die Casting, Inc., Dayton, has announced plans for the erection of a new plant on Kiser St. Construction is to start soon and occupancy is expected within 6 months.

The new building will contain 6000 sq ft of manufacturing space.

• PLENTY OF PHOSPHORUS—The new phosphorus production facilities being constructed at Columbia, Tenn., by the Monsanto Chemical Co. will result in over 50 pct increase in the company's production. The Tennessee plant was the first to use large electric furnace units for phosphorus production and was the first to produce elemental phosphorus on a large commercial scale. The new plant involves an investment of over $2 million and from the phosphorus production will come phosphoric acid, phosphorus pentoxide, phosphorus chlorides and phosphates, sodium, calcium, ammonium, potassium, etc.

• TO MAKE DIESELS — Officials of Canadian Locomotive Co., Kingston, Ontario, announced that an agreement has been entered into with Baldwin Locomotive Works of Philadelphia and its subsidiary, the Whitcomb Locomotive Co. of Rochelle, to manufacture in Canada the various types of diesel and diesel-electric locomotives developed by the two companies.

February Surplus Tools Amount to $601,853,000

Washington

• • • **Representing the** greatest value among consumer and producer goods, machine tools with an original cost of $601,853,000 were held as surplus property by WAA at the beginning of February, according to a preliminary survey. The entire property inventory amounted to $9 billion. Cutting tools were valued at $55,738,000; metal forimng tools, $55,670,000; metal cutting testing tools, $21,470,000 and bearings, $19,813,000.

Iron and steel inventories were valued at $127,711,000; nonferrous metals, $68,417,000 and valves and fittings, $59,442,000.

Among other inventories were the following in thousands of dollars: Industrial mining machinery, $24,378; farm machinery, $3931; machinery parts, $47,473; motor trucks, $109,609; hardware plumbing and general products, $433,007; electrical equipment, $149,783; steam equipment, $54,492; internal combustion engines, $73,212; metal processing equipment, $55,170; materials handling equipment, $71,185; aircraft, $1,182,952; aircraft parts components, $606,839; Detroit automotive parts, $255,242; electronics $424,659.

WAA Sells Two Plants

Washington

• • • **An aircraft** supercharger plant in Milwaukee and an aluminum cylinder head plant in Anderson, Ind., have been sold as surplus plants by WAA. The supercharger plant was sold to the Continental Can Co., Inc., New York, for $2,626,627. It formerly was operated by the Allis Chalmers Mfg. Co., and was built at a cost of $4,025,927. The purchaser, WAA said, plans to employ 1200 in the manufacture of metal containers. The anticipated payroll was given as $3,600,000.

The cylinder head plant, acquired during the war by the DPC and rehabilitated for use by General Motors Corp., was sold to the Anderson Stove Co., for $490,000. The original cost to the government was $1,083,292.

Construction Steel . . .

New York

• • • **The estimated total bookings** of fabricated structural steel for the month of January 1947, according to reports received by the American Institute of Steel Construction, amounted to 101,304 tons. This represents a 5 pct increase over the 96,601 tons booked in the preceding month.

Shipments for the month totaled 126,868 tons, or an increase of 37 pct over the 92,578 tons shipped in the same month in the averaged 5 prewar years 1936 to 1940. The tonnage available for future fabrication at Jan. 31 was 661,220 tons.

Following is the complete tabulation of bookings and shipments:

	Estimated Total Tonage for the Entire Industry 1947	Estimated Total Tonnage for the Entire Industry Avg. 1936-1940
Contracts Closed January ...	101,304	107,578
Shipments January ...	126,868	92,578
Tonnage available for fabrication within the next 4 months	661,220	302,607

• • • **Fabricated steel awards** this week included the following:

1900 Tons, various locations, storage tanks for Pure Oil Co. to Graver Tank & Mfg. Co., St. Louis.

1700 Tons, Waterbury, Conn., rolling mill for Scoville Mfg. Co. to Bethlehem Steel Co., Bethlehem, Pa., through Stone & Webster Engineering Corp., Boston.

1000 Tons, Cambridge, Mass., power plant for Cambridge Electric Co. to A. O. Wilson Structural Steel Co., Cambridge.

975 Tons, New Mexico, bridges for Santa Fe R. R. to American Bridge Co., Pittsburgh.

700 Tons, Sigurd, Utah, plaster board building for U. S. Gypsum to Kansas City Structural Steel Co., Kansas City, Kan.

500 Tons, Carneys Point, N. J., E. I. du Pont de Nemours & Co., plant extension, to Ingalls Iron Works, Verona, Ill.

500 Tons, Brooklyn, extension to Brooklyn Union Gas Co. plant, through United Engineers & Constructors, to Harris Structural Steel Co., New York.

350 Tons, Pasadena, Calif., Southern California Telephone Co., to Pacific Iron & Steel, Los Angeles.

270 Tons, Pennsylvania Power & Light Co., galvanized transmission towers, to Lehigh Structural Steel Co., Allentown, Pa.

170 Tons, Williamsport, Pa., Grit Publishing Co., to Lehigh Structural Steel Co., Allentown, Pa.

160 Tons, Philadelphia, Bornot Co., building, to Norristown Iron & Wire Co., Norristown, Pa.

110 Tons, Odair, Wash., stop logs, Grand Coulee pumping plant, Bureau of Reclamation, Denver, to Lakeside Bridge & Steel Co., Milwaukee.

100 Tons, Fairmont, W. Va., Owens-Illinois Glass Co., to Frank M. Weaver Co., Lansdale, Pa.

• • • **Fabricated steel inquiries** this week included the following:

1360 Tons, various locations, tanks, Pure Oil Co., Chicago.

900 Tons, Los Angeles, Helms Bakery, C. L. Peck, contractor.

850 Tons, Chicago, oil storage tank for Western Oil & Fuel Co.

800 Tons, Fort Wayne, Ind. building for U. S. Rubber Co., New York.

600 Tons, White Eagle, Okla., power plant.

450 Tons, Jenks, Okla., truss span, Oklahoma State Highway Dept.

365 Tons, Chicago, building for Goodman Mfg. Co.

195 Tons, Avon, Calif., bridge across Pacheco Slough, California Div. of Highways, Sacramento, bids to Mar. 26.

135 Tons, Denver, building for Firestone Tire & Rubber Co.

• • • **Reinforcing bar awards** this week included the following:

400 Tons, Minneapolis, through Fegals Construction Co., to Laclede Steel Co., mill building for Archer Daniels Co.

• • • **Reinforcing bar inquiries** this week included the following:

6600 Metric Tons, Sonora, Mexico, Alvaro Obergon Dam, Commission National, Secretary of Hydraulic Resources, Mexico City, bids to Apr. 11.

835 Tons, Adrian, Wash., West Canal, Bureau of Reclamation, Denver, Inv. G-38,-264-A, bids to Mar. 11.

700 Tons, Los Angeles, two buildings, University of California administration building and women's dormitory. Bids opened Feb. 25.

690 Tons, Wild Siding, Colo., Rams Horn and Prospect Mountain tunnels, Bureau of Reclamation, Denver, bids to Mar. 5.

300 Tons, Milwaukee, for Plankington Packing Co.

205 Tons, Urbana, Ill., mechanical engineering building, University of Illinois, James McHugh & Sons, Chicago, low bidder.

115 Tons, Avon, Calif., bridge across Pacheco Slough, California Div. of Highways, Sacramento, bids to Mar. 26.

• • • **Sheet piling awards** this week included the following:

230 Tons, Ludington, Mich., revetment for U. S. engineer to Bethelehem Steel Co., Bethlehem, Pa.

• • • **Paving mesh inquiries** this week included the following:

120 Tons, LaSalle County, Ill., paving of Route 7 section 3X-1.

• • • **Barge awards** this week included the following:

The Engineering Works Div. of Dravo Corp. is supplying the Warner Co., Philadelphia, with two hopper barges. Dravo is currently building seven standard river barges for Warner.

• • • **Railroad car awards** this week included the following:

The Turkish State Railways has purchased 62 locomotives from the Vulcan Iron Works, Wilkes-Barre, Pa. Ferro Central do Brasil has placed an order with the Budd Co., Philadelphia, for 63 stainless steel passenger cars. Chesapeake & Ohio Ry. Co. has ordered 17 head-end baggage-mail cars from Pullman-Standard Car Mfg. Co. The Southern Pacific Equipment Co. has ordered 5500 new cars placed as follows: 1500 50-ton drop bottom gondolas from Pressed Steel Car Co., 500 50-ton auto box cars from Pressed Steel Car Co., 1500 50-ton box cars from American Car & Foundry Co., 1500 50-ton box cars from Pullman Standard Car Mfg. Co., and 500 50-ton gondolas from Ralston Steel Car Co. The 500 50-ton box cars for Grand Trunk & Western R. R. and the 50 50-ton box cars for Detroit & Toledo Shore Line R. R. recently purchased will be built by Pullman Standard Car Mfg. Co. at Butler, Pa.

• • • **Railroad car inquiries** this week included the following:

The Missouri, Kansas, Texas R. R. is inquiring for 500 50-ton box cars 40 ft. 6 in. long. The Pullman Standard Car Mfg. Co. is bidding on 300 50-ton gondolas for the Denver & Rio Grande Western R. R. Co.

Allegheny Ludlum Going To Oil-Fired Equipment

Pittsburgh

• • • **Allegheny Ludlum Steel** Corp. is making a complete survey of its gas-fueled equipment with a view to converting all possible facilities from gas to oil, thereby avoiding future shutdowns caused by gas shortages during cold weather, it was announced by H. G. Batcheller, president.

The first step of the conversion program already is under way at the corporation's West Leechburg, Pa., plant, where the slab reheating furnaces are being changed over from gas to oil, permitting operation of the hot mills without regard to weather conditions. That change-over, affecting a minimum of 800 employees, will be completed early next week.

Cold weather and resultant shortages of natural gas supplies have caused curtailment of production at the corporation's West Leechburg and Brackenridge plants, this winter.

Officials of the corporation hope that sufficient regular and emergency facilities can be installed by next winter to allow full production at both mills during gas crises.

Lead Bullion Up for Sale

Washington

• • • **About 300 metric tons** of lead base bullion, 150 tons of scheelite, and 25 tons of wolframite have been offered for sale by the U. S. Commercial Co., at the port of Fusan, Korea.

It is estimated that the lead bullion contains approximately 160 grams of gold and 7000 grams of silver per ton. The scheelite was analyzed at 52 pct and the wolframite at 55 pct tungstic oxide. Closing date is past for mailing sale terms.

MACHINE TOOLS

. . . News and Market Activities

Some Builders Busy, Others Report Orders Scattered

• • • **Firm orders** are fast becoming a short supply item in some segments of the machine tool industry, and according to some observers, the sporadic order pattern of the last four weeks may be the dominant characteristic of the machine tool market until late summer. In other words, some builders will be very busy and some won't know where their next order is coming from.

This uncertain state of affairs is engendered to some extent by the government-owned machine tool surplus, currently valued at $1,100,000,000. Until the demand for these machines is decimated, either by new models or by the natural course of events, it will be hard to sell new machines at present prices against them; users can buy surplus machines too cheaply.

War Assets Administration anticipates an increase in this inventory, and at the same time, hopes to come upon some plan by July 1, 1947, by which the agency can dispose of these tools by 1948. Doubtless an important part of this ambitious project is the strategic reserve of machine tools, a matter on which Congress must act. But according to informed sources, the legislators would rather have the cash recovery on the machine tools than the "national insurance" of the reserve. On the other hand, the services want the reserve, but the question is how to get it.

Foreign business, which has figured prominently in the plans of many builders, will probably wait for the machine tool show in Chicago, Sept. 17-26, which will mean a decline in foreign orders until that time, and pretty slim picking for some segments of the industry during the next few months.

On the other hand, National Acme Co.'s total backlog of orders as of Jan. 1, 1947, was only 8 pct below the same date in 1946, and, unless some unforeseen situation develops to affect adversely general economic conditions of the nation, the company feels assured of a favorable year in 1947, according to President Fred H. Chapin's annual report to stockholders for 1946.

September Machine Tool Show May Signal a Revival In Foreign Purchases

o o o

Applications for the machine tool show are rolling in at a rate indicating that interest in the event is at an all-time high. According to reports, a large number of foreign customers, present and potential, will attend, in addition to domestic customers who will be there in tremendous numbers.

In Detroit a survey of machine tool producers finds little news of an encouraging nature or any promise that improvement is expected in the near future. If the current report is true that one of the prominent auto body builders plans to discontinue production of one of its popular bodies with a long sloping back, this would indicate a further move by auto producers in the direction of retrenchment and standardization and possibly another restriction in the future market for new tooling.

Latest word on the progress of automatic transmission programs is far from encouraging, indicating that the Ford program may be even further from placement stage than the most pessimistic observers here had anticipated.

Some observers in Detroit are of the opinion that the present lull in the machine tool market can be attributed in part to hesitation on the part of buyers who may be waiting to see what is available at the Machine Tool Show in Chicago in September. More realistic observers, however, put it more bluntly and candidly state some of their customers are telling them that if plants have to close down because of labor trouble in April or May, they might better be shut down with old tools than with new equipment. That settlement of present and pending labor problems would undoubtedly do much to help the situation is almost unanimously admitted.

Cincinnati interests in the machine tool industry indicate that foreign business has increased slightly during the past several weeks, but is still about 40 pct of the total demand. Domestic business remains in the doldrums, and builders are somewhat apprehensive of this situation. It was indicated, however, that this month would fall short of the business of last month.

The American Tool Works has been the scene of much discussion with United Electric Radio and Machine Works (CIO) concerning a $13 million portal suit, as well as a strike for a 10¢ an hr increase. Outcome of this discussion has been successful, and a possible strike averted, with the union and company agreeing on the increase and the withdrawal of the union's suit.

Reports from New England machine tool builders indicate makers of grinding equipment have been on their toes so far as export business goes. They have reached out to a majority of European countries, and in the other direction, to Brazil and Argentina.

Grinders have already been shipped to Sweden, France, Russia, Switzerland, Portugal and Belgium, and to Argentina and Brazil. More are scheduled for shipment to Portugal, Russia, Belgium, Brazil and Argentina. The field has not been scratched, according to the makers of grinding equipment. Foreign buyers have been equally interested in external as well as internal grinders.

Experience points to

Bliss for rolling mills

Hundreds of outstanding Bliss sheet and strip mill installations—here and abroad—give daily evidence of the close cooperation between customer and builder which alone can create a mill exactly suited to the job at hand.

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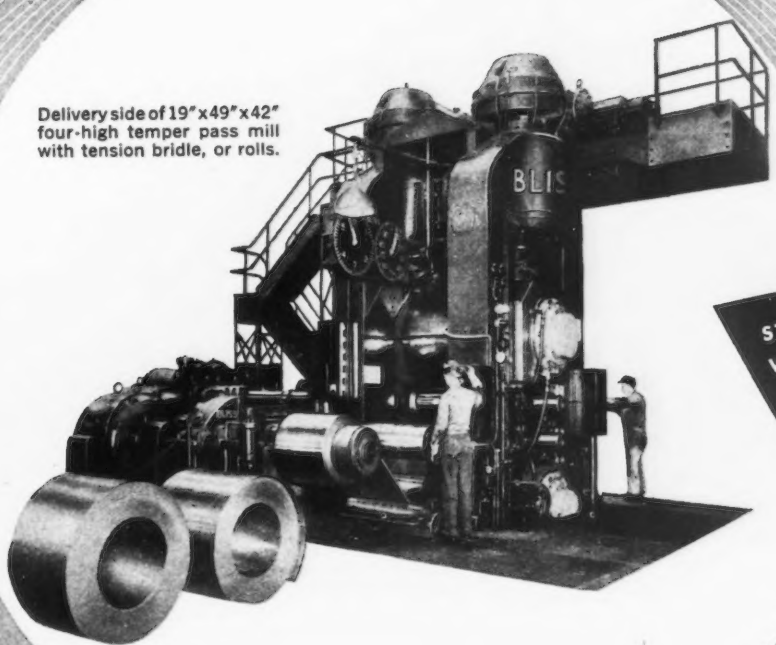


Delivery side of 19"x49"x42" four-high temper pass mill with tension bridle, or rolls.

STAY AHEAD WITH *Bliss*

NONFERROUS METALS

. . . News and Market Activities

Copper

• • • **On Monday** the Phelps Dodge Corp. and the American Smelting & Refining Co. announced a price of 21.50¢ per lb for electrolytic copper delivered Connecticut Valley, increases of 2¢ and 1¢ respectively. Calumet and Hecla Consolidated Copper Co. also increased its price 2¢ to bring the price of Lake Copper to 21.625¢ delivered Midwest or Connecticut Valley. Kennecott Copper Corp. had not increased its price on Monday but it is believed likely to follow suit.

The increase in prices resulted fro mthe action of the OWMR in establishing for March allocations the sales price of copper imported by RFC at its acquisition cost or market price, whichever is higher. Since the acquisition cost, including a 4¢ tariff, is estimated by the government to be the equivalent of 21.50¢ delivered Valley, this announcement and its logical after effects has served to establish the domestic market at that price. The government has reported that some 55,000 tons of copper are available for allocation, the equivalent of what was formerly a single month's allocation of foreign copper. This relatively small tonnage therefore has been responsible for raising the entire domestic copper market by nearly 2¢ per lb. However this increase brings the domestic market into a sounder relationship with the world copper price which is now reported at 21.00¢ f.a.s. New York. With duty applied, this price becomes 25.00¢ delivered New York.

It is quite likely that, should there be no action to suspend the tariff on copper before the government stockpile is exhausted, there must be a further rise in the price of copper. Government purchases of foreign copper ceased at the end of last year and the tonnage now available for allocation is the remainder, in part, of incoming shipments during 1947.

•

Copper Probe Is Rumored

• • • **It is reported** in the trade that the Federal Trade Commission is engaged in studying certain copper mining companies having fabricating affiliates in order to uncover whether there have been any unfair business practices in favoring them with supplies of copper at the expense of other customers.

Inquiry as to the consideration given independent fabricators by the copper mining companies has revealed in the past that at least those fabricators interviewed were of the opinion that the distribution of copper has been on an equitable basis.

•

Lead

• • • **Following the 1¢ per lb** increase in the price of lead on Feb. 25, it was hardly expected by consumers that there would be another significant increase in the immediate future. On Monday, however, the American Smelting & Refining Co. announced another price increase of 1¢ which brings its price to 15¢ per lb. The St. Joseph Lead Co. did not raise its price on Monday but early this week the trade felt that such following action would be only a matter of a few days.

The foreign demand for lead has been so great and the world supply of the metal so short that the foreign market has for some time been priced at an equivalent of 15¢ per lb here. Mexican lead producers have the option of selling to the United States or to Europe and their decision is determined by the price obtainable from each market.

In the opinion of the trade the price increase is expected to stimulate some additional recovery of lead from scrap but the tonnage is not expected to be significant. The demand for the metal, in view of the serious world shortage, is not expected to be reduced. This view seems to be confirmed by the continued demand during the past week at the 1¢ higher price.

•

Raise RFC Copper Price

Washington

• • • **The price of** copper sold by RFC beginning with March allocations will be based on average cost of acquisition or the prevailing market price for copper, whichever is higher.

In a letter to Charles B. Henderson, chairman of the board of RFC, OWMR Commissioner Harold Stein said that the new pricing policy is necessary to comply with the government's general policy of avoiding subsidized sales of materials bought by the government since the decontrol of prices.

Commissioner Stein said about 55,000 tons of copper will be available for allocation and sale under the new pricing policy during the next two or three months.

Monthly Average Prices

• • • **The average prices of the major nonferrous metals in February, based on quotations appearing in** THE IRON AGE, **were as follows:**

	Cents Per Pound
Electrolytic copper, Conn. Valley	19.75
Lake copper, Conn. Valley	19.625
Straits tin, New York	70.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Lead, St. Louis	12.967
Lead, New York	13.167

Nonferrous Metals Prices

Cents per pound

	Feb. 26	Feb. 27	Feb. 28	Mar. 1	Mar. 3	Mar. 4
Copper, electro, Conn.	19.50—20.50	19.50—20.50	19.50—20.50	19.50—20.50	21.50	21.50 ....
Copper, Lake, Conn.	19.625	19.625	19.625	19.625	21.625	21.625
Tin, Straits, New York	70.00	70.00	70.00	....	70.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	13.80	13.80	13.80	13.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	28.25
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$27.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$110.00
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8 + %	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$88 to $90
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$58 to $61
Silver, New York, cents per oz.	81.25
Tin, Straits, New York	70.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Zirconium copper, 6 pct Zr, per lb contained Zr	$ 6.00

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	20.50
No. 120	20.00
No. 123	19.50
80-10-10 ingot	
No. 305	23.50
No. 315	22.00
88-10-2 ingot	
No. 210	25.75
No. 215	24.75
No. 245	21.75
Yellow ingot	
No. 405	16.25
Manganese Bronze	
No. 421	18.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	17.75—18.00
0.60 copper, max.	17.50—17.75
Piston alloys (No. 122 type)	15.75—16.25
No. 12 alum. (No. 2 grade)	15.50—15.75
108 alloy	15.75—16.00
195 alloy	16.25—16.50
AXS-679	15.75—16.00
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-97½ pct	16.75—17.00
Grade 2—92 pct-95 pct	15.75—16.00
Grade 3—90 pct-92 pct	15.25—15.50
Grade 4—85 pct-90 pct	14.75—15.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	34⅞
Electrodeposited	28⅝
Rolled, oval, straight delivered	29¼
Curved, 18 in. or longer, delivered	29⅞
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	31⅝
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver, 999 fine	
Rolled, 1000 oz lots, per oz.	75

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	34.00
Copper sulphate, 99.5, crystals, bbls	7.75
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz lots, per oz	74.5
Sodium cyanide, 96 pct, domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums	33.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	.0635

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb. f.o.b. mill)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75. Base quantity 30,000 lb.

Round Rod: M, diam in. ⅛, 55¢; ¼, 47¢ ⅜, 46¢; ½, 45¢; ¾, 44¢; 1¾, 43.5¢; 2, 42.5¢; 3, 41.5¢; 4, 42.5¢ 5, 43.5¢; 6 & 7 in., 44¢. Base price, 5000-10,000 lb.

Square and Hexagonal Bar: M, diam in. ⅛, 58¢; ¼, 50¢; ⅜, 48¢; ½, 47.5¢; ¾, 46.5¢; 1¾, 45.5¢; 2, 44.5¢; 3, 43.5¢; 4 & 5 in. 44.5¢; 6 & 7 in., 45¢. Base quantity, 5000-10,000 lb.

Tubing: Varies with wall thickness and outside diameter.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.25
Large, over 12 in.	14.25

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	30.78	....	30.93
Copper, hot-rolled	....	27.28	....
Copper, drawn	....	28.28	....
Low brass, 80 pct	37.52	28.71	29.02
High brass	36.03	27.22	27.53
Red brass, 85 pct	38.03	29.22	29.53
Naval brass	27.50	26.25	32.19
Brass, free cutting	....	22.28	....
Commercial bronze	39.06	30.25	30.56
Manganese bronze	31.07	29.57	35.69
Phosphor bronze, 5 pct	....	49.07	48.82
Muntz metal	27.19	25.94	30.38
Everdur, Herculoy Olympic, etc.	34.45	34.73	35.79
Nickel silver, 5 pct	....	38.11	36.34
Architectural bronze	26.01	....	....

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of 15,000 lb or less)

Cartridge brass turnings	12⅞
Loose yellow brass trimmings	13¾

Copper and Brass

No. 1 heavy copper and wire	15½—16
No. 2 heavy copper and wire	14½—15
Light copper	13½—14
Auto radiators (unsweated)	10¾—11¼
No. 1 composition	14 —14¼
No. 1 composition turnings	13 —13¼
Clean red car boxes	12 —12½
Cocks and faucets	11¼—11¾
Mixed heavy yellow brass	9¾—10¼
Old rolled brass	9½—10
Brass pipe	11½—11¾
New soft brass clippings	12¼—12¾
Brass rod ends	11½—11¾
No. 1 brass rod turnings	11½—12

Aluminum

Alum. pistons with struts	4½—5
Aluminum crankcases	6¾—7
2S aluminum clippings	8¼—8½
Old sheet & utensils	6¾—7
Mixed borings and turnings	2 —2½
Misc. cast aluminum	6¼—6¾
Dural clips (24S)	5¾—6

Zinc

New zinc clippings	7 — 7⅛
Old zinc	5¼ — 5¾
Zinc routings	3 — 3⅛
Old die cast scrap	3 — 3¼

Nickel and Monel

Pure nickel clippings	22 —23
Clean nickel turnings	17 —18
Nickel anodes	19½—20½
Nickel rod ends	20 —21
New Monel clippings	14 —15
Clean Monel turnings	9 —10
Old sheet Monel	12 —12½
Old Monel castings	10 —11
Inconel clippings	10 —11
German silver clippings, mixed	10½—11
German silver turnings, mixed	7 — 7⅛

Lead

Soft scrap lead	11½—12
Battery plates (dry)	6¾— 7

Miscellaneous

Block tin	60
No. 1 pewter	46 —48
No. 1 auto babbitt	35 —36
Mixed common babbitt	12 —12¼
Solder joints	13¼—13⅜
Siphon tops	38 —39
Small foundry type	15 —15½
Monotype	12½—13
Lino and stereotype	12 —12½
Electrotype	10 —10½
New type shell cuttings (nom.)	12 —12⅞
Clean hand picked type shells	5½— 6
Lino and stereo dross	6 — 6½
Electro dross	4 — 4½

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets	17.25
Cut lead sheets	17.75
Lead pipe, manufacturing point	16.50
Lead traps and bends	List +40%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +40%
Lead wool	18.50

SCRAP

Gains Again Posted in Openhearth Grades

New York

• • • **March roared in** with sour scrap weather for much of the North and East while steel scrap prices drifted higher than the snowdrifts. However, it should be noted that the higher quotations in many consuming centers do not all indicate staggering price gains during the past week.

Instead, they reflect a decision on the part of THE IRON AGE editors to report realistically the *delivered* prices of scrap. The price changes are obvious in the larger consuming districts where the "local" market price has heretofore been quoted. The change under the reporting system put into effect this week apply primarily in those consuming districts where a lot of the melt is purchased from outlying districts. These prices now show a range in which the upper limit represents the average delivered price of the bulk of the scrap coming into these consuming districts from outside areas.

An article on today's frenzied scrap market appears on pages 117 *and* 118 *of this issue.*

Highlighting the general increase in heavy openhearth steel prices this week were gains in the three principal broker buying areas amounting to $1.75 in Detroit and $1 in both Boston and New York.

•

PITTSBURGH — Cold weather has knocked down scrap shipments sharply in this district. Collectors and yards are clean because operators are not holding scrap at present prices and collections are not coming in because of the weather. Production scrap is off somewhat because of the gas shortage in this area resulting from the cold snap. Observers report that shipments in February were considerably under those of the previous month. The railroad scrap prices are abnormally low in comparison with the rest of the prices because they are based on the negotiated sale of scrap by Pennsylvania R. R. Scrap lists of New York Central and Pittsburgh & Lake Erie closing late this week may well change this picture. It is questionable that any large tonnages of scrap could be purchased in this area, because scrap interests would have considerable difficulty in meeting the order at any price.

CHICAGO—Scrap receipts at the mills were better last week than they have been in months. The raiding of the Chicago market by a few eastern consumers has caused some yards to hesitate in filling $32.50 Chicago orders. Generally the market is very firm and local observers are wondering how long this area can hold out against higher prices in surrounding areas. Scrap coming in from other districts has increased in volume due to the drive by the steel salesmen which resulted in larger shipment of earmarked scrap from consumers. One consumer here has ruled that a $9 springboard is the maximum except in extreme cases where another dollar will bring it in. A Kansas city mill reports that the competitive price it must meet to prevent scrap going to Chicago or Pittsburgh is $38. Chicago and $42.50 to $45 Pittsburgh. Texas scrap in the Houston area which has been shipped into Chicago is now averaging $30 gross Houston, so that the latest price on this scrap delivered Chicago is about $39.

•

PHILADELPHIA — Heavy melting grades and turnings prices increased here last week with heavy melting quoted at a range of $36 to $38. The upper figure represents scrap purchased in New England delivered to eastern Pennsylvania. Turnings are selling at $27.50 to $28.50. Scrap is not coming out, according to consumers and dealers.

•

CLEVELAND — The so-called outside interference in local markets seems to be reaching its climax. Despite bad weather, scrap is moving freely and shipments to some major consumers are very good. In some cases, where mills have not canceled old orders and put out new orders, brokers have been caught in the middle. Material from outside the district is moving freely at prices up to $45, delivered consumer, and various prices are being paid for identical grades. Despite the intense competition, however, there have been some rejections reported.

•

NEW YORK — Heavy melting steel grades advanced another $1 this week. Turnings and the cast grades were also higher, the biggest markup being posted for clean chemical cast borings, which were up to $29. Shipments, which were excellent for this area in January and the first half of February, have fallen off in the past week or so due to the weather.

•

DETROIT — Prices moved upward again this week as demand continued strong. One large Detroit buyer was reported to be offering $37.50 delivered for heavy melting, although there were no indications that orders had been accepted at this price. An offer of $40 delivered for low phos plate has also been reported. Meanwhile, a large volume of earmarked scrap continues to move to mills from large steel users at prices substantially lower than those offered by brokers bidding in the open market.

BOSTON — Aside from cast, scrap is $1 a ton higher. The advance was touched off by Bethlehem Steel's purchase of navy yard unprepared steel at $30.10 a ton and by a broker of heavy steel at $31.50. Majority of cast sales are at $40 to $45 a ton with $45 predominating. Rumor has it more is being paid but such sales are not confirmed. Demand for all scrap is urgent, especially from Pennsylvania consumers.

•

BUFFALO — Scrap receipts were light the past week and dealers were pessimistic regarding the immediate outlook for improvement. Most of the material originating outside the local switching district is bypassing this market because Pittsburgh and Youngstown are willing to pay $1 or more a ton over Buffalo in nearby industrial centers. For example, Youngstown is reported paying $37.50 to $38 delivered for openhearth grades at Rochester compared with a maximum of $35 offered by Buffalo mills. Malleable displayed further strength advancing $2 a ton to $45-$47. Other prices were unaltered.

•

CINCINNATI — Although supply is none too good, prices are being resisted by consumers as much as possible. In spite of this, some purchases of No. 1 steel around $35 or $36 per ton have been made, but most prices are still nominal.

•

BIRMINGHAM — After last week's advance of $3.50 per ton on heavy melting steel, scrap prices here show little change. Pressure pipe plants at Birmingham continue to show marked reluctance to pay as much as $38.50 for No. 1 cast but this grade is bringing $42.50 at nearby Anniston from soil pipe plants and one carload last week is reported to have brought $43. Practically all scrap being consumed in this area is moving from the district's usual supplying territory of Alabama, Florida, Mississippi and Tennessee.

•

ST. LOUIS — The market is stronger and mills are paying higher prices for material. Shipments have been better except for the last few days on account of extreme cold weather despite complaints of car shortages from small cities. Consumption by the steel mills has been greater than receipts during the last few weeks.

•

TORONTO — With transportation to practically all outside localities at a standstill due to heavy snow and adverse weather conditions, there has been comparatively little movement of scrap iron and steel materials for several days. The situation is critical and it appears that consumers will have to depend on imports, chiefly from Great Britain and continental Europe, for scrap supply for the remainder of this year. Both steel mills and foundries report scrap shortage, although the former still have stocks on hand accumulated last year. Foundries, however, are out of scrap and there is virtually no cast or stove plate appearing on the market.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.00 to $40.75
RR. hvy. melting	34.50 to 35.00
No. 2 hvy. melting	35.00 to 40.75
RR. scrap rails	**41.00 to 42.00**
Rails 3 ft. and under	43.50 to 44.50
No. 1 comp'd bundles	35.00 to 40.75
Hand bdld. new shts	35.00 to 40.75
Hvy. axle turn.	35.00 to 40.75
Hvy. steel forge turn.	35.00 to 40.75
Mach. shop turn.	**28.50 to 29.00**
Short shov. turn.	**29.50 to 30.00**
Mixed bor. and turn.	**28.50 to 29.00**
Cast iron borings	**28.50 to 29.00**
No. 1 cupola cast	42.00 to 43.00
Heavy breakable cast	37.00 to 38.00
Malleable	**41.00 to 42.00**
RR. knuck, and coup.	38.00 to 38.50
RR. coil springs	38.00 to 38.50
Rail leaf springs	38.00 to 38.50
Rolled steel wheels	38.00 to 38.50
Low phos.	42.00 to 42.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to $38.00
No. 2 hvy. melting	32.00 to 38.00
No. 1 bundles	32.00 to 38.00
No. 2 dealers' bundls.	32.00 to 38.00
Bundled mach. shop turn	32.00 to 38.00
Galv. bundles	**30.00 to 30.50**
Mach. shop turn.	27.50 to 28.00
Short shov. turn.	29.50 to 30.00
Cast iron borings	28.50 to 29.00
Mix. borings & turn.	27.50 to 28.00
Los. phos. hvy. forge	**36.00 to 37.50**
Low phos. plates	34.50 to 35.00
No. 1 RR. hvy. melt.	**33.00 to 33.50**
Reroll rails	44.75 to 45.50
Miscellaneous rails	41.50 to 43.00
Angles & splice bars	**42.00 to 43.00**
Locomotive tires, cut	40.00 to 43.00
Cut bolster & side frames	39.00 to 40.00
Standard stl. car axles	43.00 to 44.00
No. 3 steel wheels	39.50 to 40.00
Couplers & knuckles	43.50 to 45.00
Malleable	45.00 to 49.00
No. 1 mach. cast	45.00 to 46.00
Rails 2 ft. and under	46.00 to 48.00
No. 1 agricul. cast	38.50 to 39.00
Hvy. breakable cast	37.50 to 38.00
RR. grate bars	40.00 to 40.50
Cast iron brake shoes	40.00 to 42.00
Stove plate	41.00 to 42.00
Cast iron carwheels	39.00 to 40.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 bundles	35.00 to 36.00
No. 2 bundles	35.00 to 36.00
Mach. shop turn.	25.00 to 25.50
Shoveling turn.	26.00 to 26.50
Cast iron borings	26.00 to 26.50
Mixed bor. & turn	25.00 to 25.50
Low phos. plate	37.00 to 38.00
No. 1 cupola cast	39.00 to 40.00
Hvy. breakable cast	35.00 to 36.00
Stove plate	31.00 to 32.00
Scrap rails	35.00 to 36.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	31.00 to 32.00
Nos. 1 and 2 bundles	31.00 to 32.00
Busheling	31.00 to 32.00
Turnings, shovelings	27.00 to 27.50
Machine shop turn	25.00 to 25.50
Mixed bor. & turn	25.00 to 25.50
Cl'n cast. chem. bor.	25.00 to 27.00
No. 1 machinery cast	40.00 to 45.00
No. 2 machinery cast	40.00 to 45.00
Heavy breakable cast	40.00 to 45.00
Stove plate	40.00 to 45.00

DETROIT

Per gross, ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$34.50 to $35.00
No. 2 hvy. melting	34.50 to 35.00
No. 1 bundles	34.75 to 35.25
New busheling	34.75 to 35.25
Flashings	34.75 to 35.25
Mach. shop turn.	25.25 to 25.75
Short shov. turn.	26.25 to 26.75
Cast iron borings	$25.50 to $26.00
Mixed bor. & turn.	24.50 to 25.00
Low phos. plate	36.50 to 37.00
No. 1 cupola cast	**41.25 to 44.25**
Hvy. breakable cast	**37.25 to 39.25**
Stove plate	**37.25 to 39.25**
Automotive cast	**nominal**

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$36.00 to $38.00
No. 2 hvy. melting	36.00 to 38.00
No. 1 bundles	36.00 to 38.00
No. 2 bundles	36.00 to 38.00
Mach. shop turn.	27.50 to 28.50
Shoveling turn.	28.50 to 29.50
Mixed bor. & turn.	27.50 to 28.50
Clean cast chemical bor.	31.00 to 32.00
No. 1 cupola cast.	45.00 to 47.00
Hvy. breakable cast	**44.00 to 45.00**
Cast. charging box	**44.00 to 45.00**
Clean auto cast	45.00 to 47.00
Hvy. axle forge turn.	36.00 to 38.00
Low phos. plate	38.00 to 39.00
Low phos. punchings	38.00 to 39.00
Low phos. bundles	37.00 to 38.00
RR. steel wheels	38.50 to 39.50
RR. coil springs	38.50 to 39.50
RR. malleable	45.00 to 46.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. Where substantial tonnages of scrap come into a consuming district from outside of that district, the upper range of the price quoted here is the representative average delivered price of the bulk of this incoming material.

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$33.00
Bundled sheets	33.00
Mach. shop turn.	$28.00 to 29.00
Locomotive tires, uncut	36.00 to 37.00
Mis. std. sec. rails	37.00 to 38.00
Rerolling rails	41.00 to 42.00
Steel angle bars	38.00 to 39.00
Rails 3 ft. and under	40.00 to 41.00
RR. springs	39.00 to 40.00
Steel car axles	37.00 to 38.00
Stove plate	33.00 to 35.00
Grate bars	33.00 to 35.00
Brake shoes	33.00 to 35.00
Malleable	42.00 to 43.00
Cast iron carwheels	38.00 to 39.00
No. 1 machinery cast	38.00 to 39.00
Breakable cast.	37.00 to 38.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	33.00
No. 2 bundles	33.00
No. 1 busheling	33.00
Long turnings	$23.00 to 23.50
Shoveling turnings	27.50 to 28.00
Cast iron borings	24.00 to 24.50
Bar crops and plate	34.00 to 34.50
Structural and plate	34.00 to 34.50
No. 1 cast	37.50 to 42.50
Stove plate	35.00 to 36.00
Steel axles	35.50 to 36.00
Scrap rails	33.00 to 34.00
Rerolling rails	38.00 to 39.00
Angles & splice bars	37.00 to 38.00
Rails 3 ft. & under	36.00 to 37.00
Cast iron carwheels	32.00 to 32.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.50 to $42.50
No. 2 hvy. melting	35.50 to 42.50
Low phos. plate	41.50 to 42.00
Hydraulic bundles	34.50 to 35.00
Mach. shop turn.	29.50 to 30.00
Short. Shovel, turn.	31.50 to 32.00
Cast iron borings	31.50 to 32.00
Elec. furnace punch	41.50 to 42.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	34.00
Comp. black bundles	34.00
Comp. galv. bundles	34.00
Mach. shop turn.	$25.50 to 26.00
Mixed bor. & turn.	25.50 to 26.00
Shoveling turn.	27.50 to 28.00
No. 1 cupola cast	41.00 to 42.00
Hvy. breakable cast	41.00 to 42.00
Charging box cast	$41.00 to $42.00
Stove plate	41.00 to 42.00
Clean auto cast.	41.00 to 42.00
Unstrip. motor blks	37.00 to 39.00
Cl'n chem. cast bor.	29.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	35.00
No. 1 bundles	35.00
No. 2 bundles	35.00
Mach. shop turn.	$28.00 to 29.00
Shoveling turn.	**30.00 to 31.00**
Cast iron borings	27.00
Mixed bor. & turn.	**28.00 to 29.00**
No. 1 cupola cast	**35.00 to 40.00**
Charging box cast	29.00 to 30.00
Stove plate	**30.00 to 35.00**
Clean auto cast	**35.00 to 40.00**
Malleable	**45.00 to 47.00**
Low. phos. plate	**36.00 to 37.00**
Scrap rails	**30.00 to 32.00**
Rails 3 ft. & under	**38.00 to 40.00**
RR. steel wheels	**37.00 to 38.00**
Cast iron carwheels	**35.00 to 38.00**
RR. coil & leaf spgs.	**36.00 to 37.00**
RR. knuckles & coup.	**36.00 to 37.00**
No. 1 busheling	35.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.00 to $39.50
No. 2 hvy. melting	35.00 to 39.50
Compressed sheet stl.	34.50 to 35.00
Drop forge flashings	34.50 to 35.00
No. 2 bundles	34.50 to 35.00
Mach. shop turn.	29.50 to 30.00
Short shovel	29.50 to 30.00
No. 1 busheling	34.00 to 34.50
Steel axle turn.	34.00 to 34.50
Cast iron borings	28.00 to 28.50
Mixed bor. & turn.	28.00 to 28.50
No. 1 machinery cast	40.00 to 45.00
Malleable	42.50 to 45.00
Railroad cast	40.00 to 45.00
Railroad grate bars	**35.00 to 37.00**
Stove plate	**37.50 to 38.00**
RR. hvy. melting	34.00 to 34.50
Rails 3 ft. & under	43.00 to 44.00
Rails 18 in. & under	44.00 to 45.00
Rails for rerolling	42.00
Elec. furnace punch	38.00 to 38.50

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	**$19.50**
No. 2 hvy. melting	**19.50**
No. 2 bales	**19.50**
No. 3 bales	**16.00**
Mach. shop turn.	**13.00**
Elec. furn. 1 ft. und.	**25.00**
No. 1 cupola cast	$32.00 to **33.00**
RR. hvy. melting	**20.50**

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	**$19.50**
No. 2 hvy. melting	**19.50**
No. 1 bales	**19.50**
No. 2 bales	**19.50**
No. 3 bales	**16.00**
Mach. shop turn.	**14.50**
No. 1 cupola cast	$35.00 to 36.00
RR. hvy. melting	20.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melting	$20.00
Elec. furn. 1 ft. und.	22.50
No. 1 cupola cast	**29.00**
RR. hvy. melting	21.00

HAMILTON, ONT.

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

Heavy melting	**$17.50***
No. 1 bundles	**17.50***
No. 2 bundles	**17.00***
Mixed steel scrap	**15.50***
Rails, remelting	**18.50***
Rails, rerolling	**21.50***
Bushelings	**13.00***
Mixed borings & turnings	12.50*
Electric furnace bundles	**20.50***
Manganese steel scrap	**20.00***
No. 1 cast	**19.00***
Stove plate	**17.50***
Car wheels, cast	**19.50***
Malleable iron	**16.00***

* Ceiling price

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Mar. 4, 1947	Feb. 25, 1947	Jan. 28, 1947	Mar. 5, 1946
Hot-rolled sheets	2.50	2.50	2.50	2.425
Cold-rolled sheets	3.20	3.20	3.20	3.275
Galvanized sheets (10 ga.)	3.55	3.55	3.55	4.05*
Hot-rolled strip	2.50	2.50	2.50	2.35
Cold-rolled strip	3.20	3.20	3.20	3.05
Plates	2.65	2.65	2.65	2.50
Plates, wrought iron	5.95	5.95	5.95	4.112
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00
*24 ga				
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.60	2.50
Cold-finished bars	3.20	3.20	3.20	3.10
Alloy bars	3.05	3.05	3.05	2.92
Structural shapes	2.50	2.50	2.50	2.35
Stainless bars (No. 302)	26.00	26.00	25.97	24.00
Wrought iron bars	6.15	6.15	6.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.30	3.30	3.30	3.05
Wire nails	3.75	3.75	3.75	3.25
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.39*
Light rails	2.85	2.85	2.85	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$42.00	$42.00	$42.00	$39.00
Sheet bars	50.00	50.00	50.00	38.00
Slabs, rerolling	42.00	42.00	42.00	39.00
Forging billets	50.00	50.00	50.00	47.00
Alloy blooms, billets, slabs	61.00	61.00	61.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.55	2.55	2.30
Skelp	2.35	2.35	2.35	2.05

Pig Iron: (per gross ton)	Mar. 4, 1947	Feb. 25, 1947	Jan. 28, 1947	Mar. 5, 1946
No. 2, foundry, Phila.	$36.51	$32.51	$32.51	$27.59
No. 2, Valley furnace	33.50	30.50	30.50	25.75
No. 2, Southern, Cin'ti	31.75	31.75	31.75	26.19
No. 2, Birmingham	26.88	26.88	26.88	22.13
No. 2, foundry, Chicago†	33.00	30.50	30.50	25.75
Basic, del'd eastern Pa.	37.67	33.67	31.93	27.09
Basic, Valley furnace	33.00	30.00	30.00	25.25
Malleable, Chicago†	33.50	30.50	30.50	25.75
Malleable, Valley	33.50	30.50	30.50	25.75
Charcoal, Chicago	42.99	42.99	42.99	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$37.88	$35.50	$32.25	$20.00
Heavy melt'g steel, Phila.	37.00	34.50	31.00	18.75
Heavy melt'g steel, Ch'go	35.00	32.25	29.75	18.75
No. 1, hy. comp. sheet, Det.	35.00	33.00	27.00	17.32
Low phos. plate, Youngs'n	41.75	41.25	34.25	22.50
No. 1, cast, Pittsburgh	42.50	42.50	40.50	20.00
No. 1, cast, Philadelphia	46.00	46.00	44.50	20.00
No. 1, cast, Chicago	44.25	44.25	44.25	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$9.00	$9.00	$8.75	$7.50
Foundry coke, prompt	10.25	10.25	8.50	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	19.75	19.50	12.00
Copper, Lake, Conn.	21.625	19.625	19.625	12.00
Tin, Straits, New York	70.00	70.00	70.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	14.80	13.80	12.80	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	28.25	28.25	28.25	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

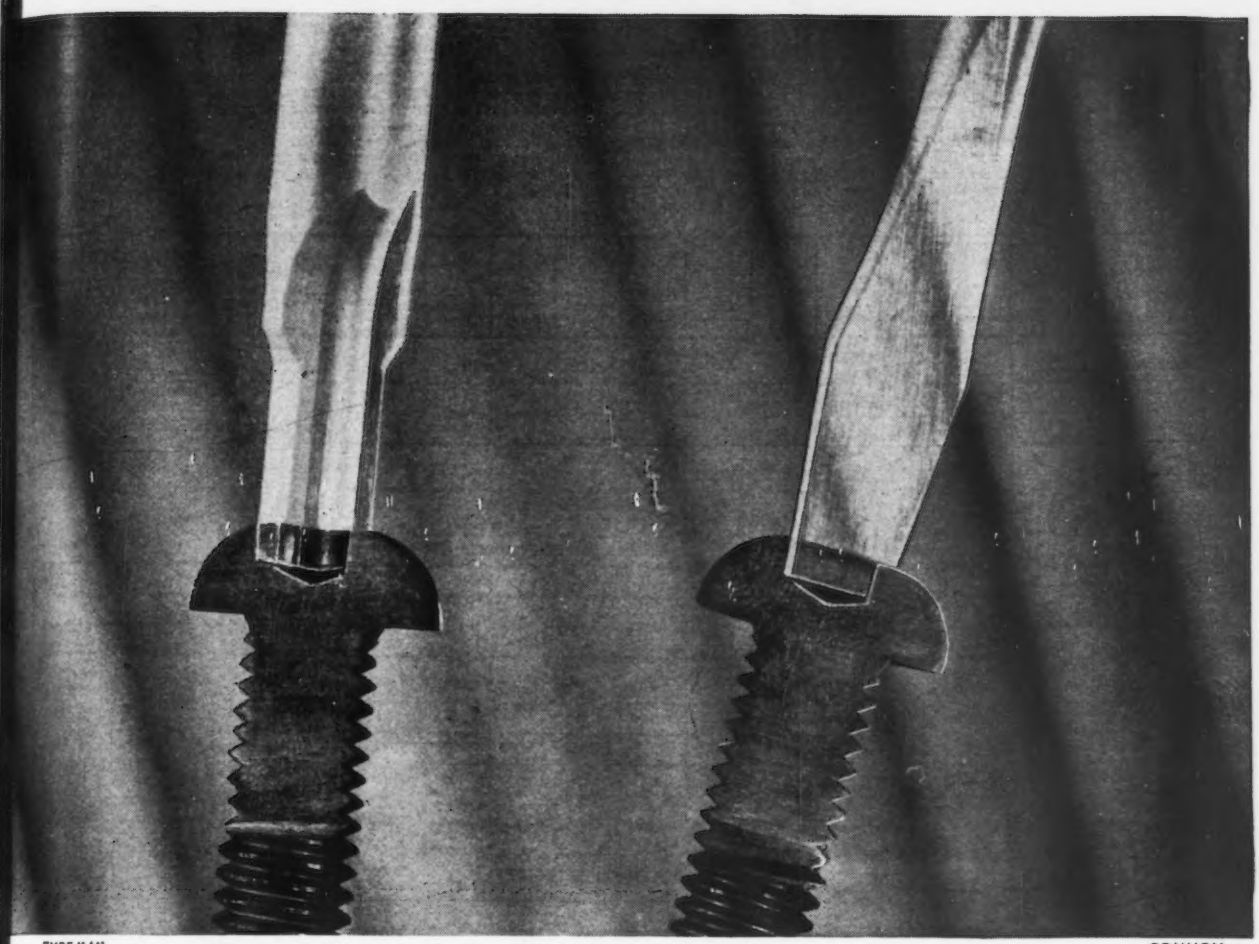
	FINISHED STEEL	PIG IRON	SCRAP STEEL
Mar. 4, 1947	2.86354¢ per lb.	$32.23 per gross ton.	$36.67 per gross ton.
One week ago	2.86354¢ per lb.	$30.15 per gross ton.	$34.08 per gross ton.
One month ago	2.86354¢ per lb.	$30.14 per gross ton.	$31.00 per gross ton.
One year ago	2.54490¢ per lb.	$25.37 per gross ton.	$19.17 per gross ton.

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1947	2.86354¢	2.86354¢	$32.23 Mar. 4	$30.14 Jan. 7	$36.67 Mar. 4	$31.00 Jan. 7
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

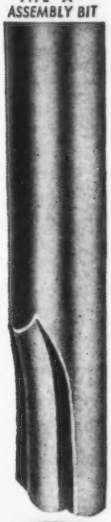
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



TYPE "A" ASSEMBLY BIT



COMMON SCREWDRIVER

Here's the Quick Answer to CLUTCH HEAD *Supremacy*

All "taken apart" for your examination and comparison... the principle of CLUTCH HEAD'S logical construction for safer, smoother, faster, and lower-cost assembly operation.

Note the Center Pivot column on the assembly bit; how it matches the curvature in the recess for dead-center entry.

This automatically straightens the driving action; checks out driver canting for "chewed-up" heads and slippage.

Look through the "phantom" bit. You see straight sides of the driver matching straight walls of the clutch recess.

Hence CLUTCH HEAD'S non-tapered drive . . . with no ride-out to kick the driver into damaging skids.

Add to that the smoother, easier driving action with this all-square contact . . . no ride-out, therefore no call for exhausting end pressure.

To the right, you see how CLUTCH HEAD is basically designed for common screwdriver operation. The torque grip is definite on two broad deep-down pressure areas for quick and easy field adjustment without damage to screw.

We invite you to make your own test on these and the several other exclusive CLUTCH HEAD *features. Send for screw assortment and sample Type "A" Bit. Check the Lock-On that unites screw and bit as a unit for one-handed reaching; figure the tool economy of the Type "A" Bit ...and what screwdriver control means to simplified servicing of your product in the field.*

CLUTCH HEAD SCREWS

UNITED SCREW AND BOLT CORPORATION

CLEVELAND 2 CHICAGO 8 NEW YORK 7

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) This base price for annealed, bright finish wire, commercial spring wire. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices; includes 3 pct freight tax. (15) 0.035 to 0.075 in. thick by ¾ to 3⅛ in. wide. (16) Some producers are charging 2.75c.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($35.00 f. o. b. mill)														
Carbon, forging	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00								
Alloy	$52.00	$52.00				$52.00	(Bethlehem, Massillon, Canton, Coatesville=$52.00)								
BILLETS, BLOOMS, SLABS															
Carbon, rerolling	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	(Provo=$53.20) $42.00	$42.00					$45.00		
Carbon, forging billets	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	(Provo=$61.20, Duluth=$52.00[13]) $50.00						$53.00		
Alloy	$61.00	$61.00				$61.00	(Bethlehem, Massillon, Canton=$61.00)						$64.00		
SHEET BARS							$50								
PIPE SKELP	2.35¢	2.35¢					2.35¢	2.35¢	(Coatesville=2.35¢)						
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢	(Worcester=2.65¢)						3.27¢[13]			
SHEETS															
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢			2.65¢	2.79¢	2.70¢
Cold-rolled [1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢				3.35¢	3.61¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.65¢					3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢				3.70¢	3.95¢	3.93¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢											3.95¢	3.91¢
STRIP															
Hot-rolled [3]	2.50¢	2.50¢	2.50¢	2.50¢[15]	2.50¢		2.50¢						2.65¢	2.93¢	2.88¢
Cold-rolled [4]	3.20¢	3.30¢		3.20¢			3.20¢			(Worcester=3.40¢)			3.35¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢							3.09¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85			(Warren, Ohio=$5.75)		$6.157	$6.062[11]
Electro, box { 0.25 lb. / 0.50 lb. / 0.75 lb. }	Deduct 90¢ from standard coke base box price. Deduct 70¢ from standard coke base box price. Deduct 50¢ from standard coke base box price.														
BLACKPLATE															
29 gage [5]	3.60¢	3.60¢	3.60¢		3.70¢			3.70¢	3.70¢			(Warren, Ohio=$5.75)		3.99¢	3.90¢
TERNES, MFG.															
Special coated, base box	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢					3.285¢	2.75¢	3.01¢	2.98¢
Rail steel [6, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢									
Reinforcing (billet) [7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢				2.985¢	2.60¢	2.74¢	2.65¢
Reinforcing (rail) [7, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢						2.75¢		
Cold-finished [8]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	(Detroit=3.25¢)							3.61¢	3.53¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton=3.05¢)					3.20¢		3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢		3.80¢							3.95¢		
PLATE															
Carbon steel [12]	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢	(Coatesville, Claymont=2.80¢, Geneva, Utah=2.80¢) 2.65¢				3.46¢[14]		2.87¢	2.85¢
Floor plates	3.90¢	3.90¢												4.30¢	4.28¢
Alloy	3.79¢	3.79¢			(Coatesville=4.10¢)									4.01¢	3.895¢
SHAPES															
Structural	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢	(Geneva, Utah=2.65¢) (Bethlehem=2.50¢)					3.41¢[14]		2.70¢	2.64¢
SPRING STEEL, C-R															
0.26 to 0.40 carbon	3.20¢			3.20¢			(Worcester=3.40¢)								
0.41 to 0.60 carbon	4.70¢			4.70¢			(Worcester=4.90¢)								
0.61 to 0.80 carbon	5.30¢			5.30¢			(Worcester=5.50¢)								
0.81 to 1.00 carbon	6.80¢			6.80¢			(Worcester=7.00¢)								
Over 1.00 carbon	9.10¢			9.10¢			(Worcester=9.30¢)								
MANUFACTURERS' WIRE [9]															
Bright [10]	3.30¢	3.30¢		3.30¢	3.30¢		(Worcester=3.40¢, Duluth=3.35¢)					5.63¢[13]		3.71¢	3.68¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢		(Worcester=4.35¢, Duluth=4.50¢)				(Trenton=4.50¢)		5.24¢[13]		4.66¢	4.345¢
PILING															
Steel sheet	3.00¢	3.00¢				3.00¢								3.41¢	3.36¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Carton, Balt.	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J. Phila., Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)*

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.20¢
Armature	4.50¢
Electrical	5.00¢
Motor	5.70¢
Dynamo	6.45¢
Transformer 72	6.95¢
Transformer 65	7.65¢
Transformer 58	8.35¢
Transformer 52	9.15¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel), f.o.b. Williamsport, Pa.	2.95

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, add 25¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.75	$13.50

CLAD STEEL

Base prices, cents per pound

Stainless-clad	*Plate*	*Sheet*
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	24.00*	22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	...
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	29.00	...
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	*Delivered San Francisco*
Standard, galvanized and coated nails	$3.75†	$4.83
Cut nails, carloads, Pittsburgh base	5.30	....

†10¢ additional at Cleveland, 30¢ at Worcester.

	Base per 100 lb	
Annealed fence wire	$3.95‡	$4.96
Annealed galv. fence wire	4.40‡	5.41

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column	
Woven wire fence*	84	107
Fence posts, carloads	82††	...
Single loop bale ties	86	110
Galvanized barbed wire**	94	114
Twisted barbless wire	94	...

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. †† Pittsburgh; Duluth 90.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	Y-50	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill	Great Lakes Steel
Plates	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	....	4.10
Sheets										
Hot-rolled	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled	4.75	4.75	4.75	....	4.75	4.75	4.75	4.75	5.225*	4.55
Galvanized	....	5.40	....	....	....	5.40	....	....	....	....
Strip										
Hot-rolled	3.85	3.85	3.85	....	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled	....	....	4.75	....	....	4.75	4.75	4.75	5.00*	4.55†
Shapes	....	3.85	....	....	3.85	3.85	3.85	3.85	....	....
Beams	....	3.85	....	....	....	3.85	....	....	....	....
Bars										
Hot-rolled	4.00	4.00	4.00	....	....	4.00	4.00	4.00	....	4.00
Cold-rolled	....	....	....	....	....	....	....	4.60	....	....
Bar shapes	....	4.00	....	....	4.00	4.00	4.00	4.00	....	....

* 21 gage and lighter. † Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. F.ob. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only

Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
½-in.	55½	41
¾-in.	58½	45
1 to 3-in.	60½	47½
Wrought Iron, buttweld		
½-in.	2	+20
¾-in.	11½	+10
1 and 1¼-in.	17	+ 2
1½-in.	22½	1½
2-in.	23	2
Steel, lapweld		
2-in.	53	39½
2½ and 3-in.	56	42½
3½ to 6-in.	58	44½
Steel, seamless		
2-in.	52	38½
2½ and 3-in.	55	41½
3½ to 6-in.	57	43½
Wrought Iron, lapweld		
2-in.	14½	+ 5½
2½ to 3½-in.	17	+ 1½
4-in.	21	4
4½ to 8-in.	19	2½

Extra Strong, plain ends

Steel, buttweld		
½-in.	54½	41½
¾-in.	58½	45½
1 to 3-in.	60	48
Wrought Iron, buttweld		
½-in.	6½	+14
¾-in.	12½	+ 8
1 to 2-in.	22	2
Steel, lapweld		
2-in.	52	39½
2½ and 3-in.	56	43½
3½ to 6-in.	59½	47
Steel, seamless		
2-in.	51	38½
2½ and 3-in.	55	42½
3½ to 6-in.	58½	46
Wrought Iron, lapweld		
2-in.	17½	+ 2
2½ to 4-in.	26	8½
4½ to 6-in.	22	4

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

O.D. in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$15.29	$18.17	$15.00	$17.95
2½	12	20.57	24.43	20.11	24.07
3	12	22.87	27.18	22.26	26.68
3½	11	28.86	34.30	28.06	33.64
4	10	35.82	42.55	34.78	41.68

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in., del'd Chicago	$75.56
6-in. to 24-in. del'd New York	73.80
6-in. to 24-in., Birmingham	65.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	89.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	55
9/16 & ⅝ in. x 6 in. & shorter	52
¾ in. x 6 in. & shorter	49
1⅛ in. and larger, all lengths	48
Lag, all diam over 6 in. long	48
Lag, all diam x 6 in. & shorter	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	48
9/16 to 1 in. inclusive	47
1⅛ to 1½ in. inclusive	45
1⅝ in. and larger	44

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct. allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less case lots		
7/16 in. and smaller	..	51
½ in. and smaller	48	..
½ in. through 1 in.	..	48
9/16 in. through 1 in.	47	..
1⅛ in. through 1½ in.	45	46
1⅝ in. and larger	44	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

	Consumer
Packages, nuts separate	60 and 10
In bulk	74

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws

(In packages)

	Percent Off List Consumer
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	56
Set screws, cup and oval points	61
Milled studs	33
Flat head cap screws, listed sizes	21
Fillister head cap, listed sizes	40

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, non-bessemer	5.80
Mesabi, bessemer	5.70
Mesabi, non-bessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots f.o.b. shipping point.

Brass, minus 100 mesh	23¢ to 2[illegible]
Copper, electrolytic, 100 and 325 mesh	30¢ to 31[illegible]
Copper, reduced, 150 and 200 mesh	29¢ to 30[illegible]
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 1[illegible]
Swedish sponge iron, 100 mesh, c.l.f. N. Y., carlots, ocean bags	7.4¢ to [illegible]
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	[illegible]
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	6[illegible]
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	25¢ to 3[illegible]
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17[illegible]
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.7[illegible]
Aluminum, 100, 200 mesh, carlots	23¢ to 2[illegible]
Antimony, 100 mesh	36.0[illegible]
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.02[illegible]
Lead, 100, 200 & 300 mesh	18.50¢ to 23.50[illegible]
Manganese, minus 325 mesh and coarser	3[illegible]
Nickel, 150 mesh	51[illegible]
Silicon, 100 mesh	18.1[illegible]
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	76.7[illegible]
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.[illegible]
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$8.75 to $9.25
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	10.00 to 10.50
Foundry, Byproduct	
Chicago, del'd	$16.10
Chicago, f.o.b.	15.10
New England, del'd	16.01
Seaboard, Kearney, N. J., f.o.b.	15.35
Philadelphia, del'd	15.46
Buffalo, del'd	16.14
Ashland, Ohio, f.o.b.	13.35
Painesville, Ohio, f.o.b.	14.60
Erie, del'd	15.75
Cleveland, del'd	15.90
Cincinnati, del'd	15.39
St. Louis, del'd	15.85
Birmingham, del'd	12.35

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads Per 1000
Sec. quality, Ohio	57.00
First quality, Pa., Md., Ky., Mo., Ill., Ohio	65.00
First quality, New Jersey	70.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	59.00
Sec. quality, New Jersey	62.00
Sec. quality, Ohio	57.00
Ground fire clay, net ton, bulk	9.50

Silica Brick

Pennsylvania and Birmingham	$65.00
Chicago District	74.00
Silica cement, net ton (Eastern)	11.50
Chicago	12.50

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	22.00
in sacks	26.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. York, Pa.	10.05
Midwest, add 10¢; Mo. Valley, add 20¢	

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		Plates 3/16 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot-Rolled (10 gage)	Cold-Rolled (10 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
**Philadelphia	$4.24	$5.33	$5.29a	$4.43	....	$4.40	$4.22	$4.48	$5.38	$8.37	$8.37	$9.88	$9.88
New York	4.42	5.72[1]	5.47	4.62	5.25	4.72	4.37	4.62	5.42	8.42	8.42	9.92	9.92
Boston	....	6.218	....	....	5.156	....	....	....	5.468	....	....	....	....
Baltimore	4.09	....	5.14	....	....	4.39	4.34	4.45	5.35	....	....	....	....
Norfolk	4.35	....	....	....	....	4.50	4.50	4.75	5.50	....	....	....	....
Chicago	4.00	....	....	4.00	....	4.30	4.05	4.05	4.95	8.10	8.10	....	9.35
Milwaukee	4.199	5.349	5.249	4.199	....	4.499	4.249	4.249	5.149	8.399	8.399	9.849	9.649
Cleveland	....	....	....	4.188	....	4.30†	4.311	4.05	4.95	8.358	8.358	9.35	9.35
Buffalo	4.00	5.15	5.35	4.302	6.002	4.65	4.05	4.05	4.95	8.10	8.10	9.35	9.35
Detroit	4.14	5.29	5.42	4.34	....	4.59	4.42	4.19	5.00	....	....	....	....
Cincinnati	4.116	4.716	5.166	....	....	4.803	....	....	5.252	....	....	....	....
St. Louis	4.199	5.349	5.424	4.199	....	4.499	4.249	4.249	5.324	8.574	8.574	9.824	9.824
Pittsburgh	3.725	4.60[1]	....	4.00	....	3.95	3.80	4.05	4.95	8.10	8.10	9.35	9.35
St. Paul	3.384[7]	5.534[1]	5.434[2]	4.404[7]	....	4.884[7]	4.434[7]	4.434[7]	5.726[6]	....	10.084[6]	....	11.726[5]
Duluth	....	....	....	....	....	....	....	....	....	....	....	....	....
Omaha	4.868	6.618[1]	5.918	4.862	....	5.168	4.918	4.918	5.818	....	....	....	....
Indianapolis	....	....	....	....	....	....	....	....	....	....	....	....	....
Birmingham	3.85	....	5.20	4.10	....	4.30	4.05	4.05	5.83	....	....	....	....
Memphis	....	....	....	....	....	....	....	....	....	....	....	....	....
New Orleans	*4.46[11]	5.77[1]	....	....	....	4.83[11]	*4.68[11]	*4.78[11]	6.14	....	....	....	....
Los Angeles	....	....	....	....	....	....	....	....	....	....	....	....	....
San Francisco	4.90[8]	6.30[9]	6.45	5.20[8]	....	5.00[8]	4.90[8]	4.70[8]	7.00[10]	....	....	....	....
Seattle	5.00	7.80	6.05	....	....	5.25	4.95	4.90	6.75	....	....	....	....
Portland	5.00[3]	....	6.25	....	....	5.40	5.10	5.10	....	....	....	....	....
Salt Lake City	5.85	....	7.10	....	....	5.55	5.85	5.95	7.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 10,000 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999; (11) 400 to 3999.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

* Add 46¢ for sizes not rolled in Birmingham.

** City of Philadelphia area only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area after deducting 34¢ per 100 lb (L.c.l. Sparrows Point to Philadelphia).

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT* PRICES						DELIVERED PRICES† (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	31.00	31.50	32.00	32.50	.....	Boston	Everett	$0.50 Arb.	29.50	30.00	30.50	31.00	.....
Birdsboro	34.00	34.50	35.00	35.50	39.00	Boston	Birdsboro-Steelton	4.82	....	....	....	....	40.82*
Birmingham	26.38	26.88	....	....	.....	Brooklyn	Bethlehem	3.00	34.00	34.50	35.00	35.50	.....
Buffalo	30.00	30.50	31.00	31.50	.....	Brooklyn	Birdsboro	3.50	....	....	....	....	43.50
Chicago	32.50	33.00	33.50	34.00	.....	Canton	Clev., Ygstn., Sharpsville	1.67	34.67	35.17	35.17	35.67	.....
Cleveland	30.00	30.50	30.50	31.00	.....	Cincinnati	Birmingham	4.87	31.25	31.75	....	....	.....
Duluth	33.00	33.50	34.00	34.50	.....	Jersey City	Bethlehem	1.84	32.84	33.34	33.84	34.34	.....
Erie	32.50	33.00	33.50	34.00	.....	Jersey City	Birdsboro	2.33	....	....	....	....	41.33
Everett	29.00	29.50	30.00	30.50	.....	Los Angeles	Provo	5.64	35.94	36.44	....	....	.....
Granite City	30.00	30.50	30.50	31.00	.....	Mansfield	Cleveland-Toledo	2.33	34.83	35.33	36.01	33.51	.....
Neville Island	33.00	33.50	33.50	34.00	.....	Philadelphia	Swedeland	1.01	36.01	36.51	37.01	37.51	.....
Provo	30.00	30.50	....	....	.....	Philadelphia	Birdsboro	1.49	....	....	....	....	40.49
Sharpsville	33.00	33.50	33.50	34.00	.....	San Francisco	Provo	5.94	35.94	36.44	.....	.....	.....
Steelton	31.00	....	....	....	36.00	Seattle	Provo	5.94	35.94	36.44	....	....	.....
Swedeland	35.00	35.50	36.00	36.50	.....	St. Louis	Granite City	0.75 Arb.	30.75	31.25	31.25	31.75	.....
Toledo	32.50	33.00	33.50	34.00	.....								
Troy, N. Y.	....	....	....	....	36.00								
Youngstown [1]	30.00	30.50	30.50	31.00	.....								

* To $43.82.

(1) Struthers Iron & Steel Co., Struthers, Ohio, charges 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base price for low phosphorous $37.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $42.99. High phosphorous charcoal pig iron is not being produced.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$38.00; f.o.b. Buffalo—$39.25. Add $1.00 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.40	6.65	7.20
Ton lots	7.30	7.90	9.80
Less ton lots	7.70	8.30	10.20

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$39.00	$40.00
F.o.b. Pittsburgh	44.00	

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C, 7.00% max. Si	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.45
Ton lots	7.40
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.15
Ton lots	7.05
Less ton lots	7.45

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $56.00 f.o.b. Keokuk, Iowa; $52.75 f.o.b. Jackson, Ohio; $54.00 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	14.65	16.90	18.65
97% Si, 1% Fe	15.05	17.30	19.05

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb briquets.

	Eastern	Central	Western
Carload, bulk	3.85	4.10	4.30
Ton lots	4.75	5.35	5.65
Less ton lots	5.15	5.75	6.05

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	11.65	...	...
50% Si	7.45	7.95	8.15
75% Si	9.25	9.55	10.30
80-90% Si	10.45	10.75	11.50
90-95% Si	12.05	12.35	13.05

Ferrochrome (65-72% *Cr, 2% max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr, 4-6% C, 6-9% Si	16.60	17.00	17.15

Briquets — contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60.65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.60	$2.35	$2.95
Less ton lots	1.95	2.70	3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	13.50	14.60	16.55
Less ton lots	14.25	15.35	17.30

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼x down, packed, f.o.b plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed	$1.90
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Les ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton	$65.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy. Carload, lots	14.50¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy Carload, bulk	4.85¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	6.25¢
Ton lots	6.75¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	8.50¢
Ton lots	9.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound. Carload lots	35¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.	
No. 1	87.5¢
No. 6	60¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, f.o.b., Suspension Bridge, N.Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0%, Al 1.0—2.0%. Ton lots, per pound	8.0¢

Right to the Point

New York

• • • At a recent meeting of the New York Chapter of the American Steel Warehouse Assn. warehouse executives listed six points which they considered most important in today's markets as: (1) Confusion in steel prices at the mills, because of delays in disclosing correct applications of extras; (2) steel warehouse inventories vary at present, with some warehouses better stocked than others; (3) there has been an influx of new steel buyers, representing new business ventures, and many seem to lack adequate capital; (4) credit terms have to be carefully watched, but losses continue to be small; (5) mill shipments show signs of improvement in future months, with some talk of enabling warehouses to reach normal stocks during the third quarter, and (6) industrial buyers are becoming more dependent upon steel warehouses because they want to hold factory inventories to a minimum.

National Screw Machine Group to Meet Mar. 19

Cleveland

• • • National Screw Machine Products Assn. will hold its 1947 annual meeting here Mar. 19 through Mar. 22, at Hotel Cleveland, according to an announcement by Orrin B. Werntz, executive secretary of the association.

The meeting will mark the 10th anniversary of the establishment of NSMPA offices here, and will recognize a number of men who have served the industry for 50 years or longer.

Heading the list is A. I. Galorneau, Central Screw Products Co., Detroit, Mich., who started in the industry in 1881 in the shipping department of Central Screw Products at 12 years of age. Others, whose service to the industry will be recognized are H. B. Lundberg, Lundberg Screw Products Co., Lansing, Mich; Edward Von Driska, Rasco Co., Rockford, Ill.; Alfred P. Wheeler, Frank Wheeler & Son Inc., Meriden, Conn.; Archibald R. LeMieux, Wright Machine Co., Worcester, Mass.; and A. J. Uthe, Couch-Uthe Co., Elyria, Ohio.

NSMPA directors and committees will meet on Mar. 19.

EC&M CUBICLE-TYPE STARTERS for SYNCHRONOUS MOTORS

STANDARD 2300 AND 4600 VOLT STARTER WITH DISCONNECT SWITCHES

STANDARD 220-550 VOLT STARTER WITHOUT DISCONNECT SWITCHES

Complete Units -- Push Button Operated

with automatic field application by Polarized Field-Frequency Relay

WITH all internal wiring complete, and totally enclosed, these EC&M unit-type Synchronous Starters provide a quick, low-cost installation. They are shock-proof and do not require an expensive control room. Mounting them out in the plant, alongside the motors they control, keeps the length of heavy cable between motors and starters at a minimum, particularly those designed for reduced voltage starting.

All starters are of the push button, magnetic type arranged to start the motor as a squirrel-cage motor, and then apply direct current field excitation when the motor has attained a speed most favorable for synchronizing. The Polarized Field-Frequency Relay operates *automatically* to pull the motor into step without pole slippage, with minimum current and maximum synchronizing torque.

Being sensitive to motor speed, the relay also operates to remove the field, should the motor pull out of step due to a dip in voltage or to an overload. If the motor has adequate torque to re-accelerate the load up to synchronizing speed, re-synchronization occurs automatically.

Write for Bulletins 1075-B, 1076-B, 1077-A and 1078-A

THE ELECTRIC CONTROLLER & MFG. CO.
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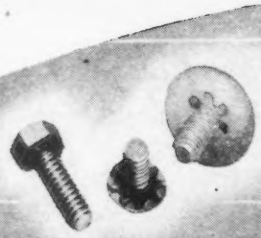
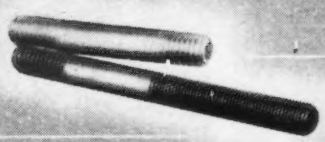


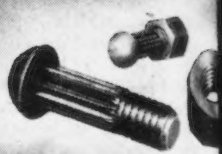
SEMS—Pre-assembled Screw and Lockwasher units

SPECIALTY NUTS, including cone, barrel, plier, oblong, Tri-Slot, half-round

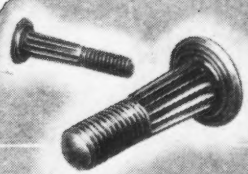
LAMSON LOCK NUTS—One-piece, all-steel—can be re-used repeatedly



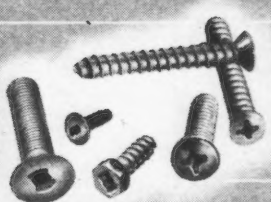
MILLED STUDS in a full range of sizes



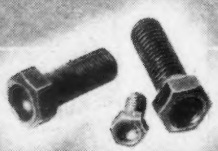
DARDELET RIVET-BOLTS with the locking thread . . . time savers for steel construction



WEATHER-TIGHT Bolts—modern fasteners for wood assemblies—eliminate counterboring



PHILLIPS and CLUTCH RECESSED HEAD Machine Screws and Sheet Metal Screws

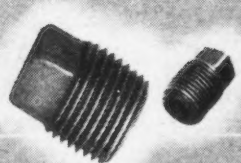


PLACE BOLTS—for locking assemblies rigidly

"1035" SET SCREWS of hi-tensile heat-treated steel, square head or headless

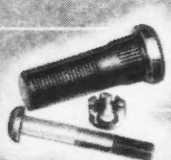
BENT" Bolts, including U Bolts, L, Hook and Eye Bolts

WIRE ROPE CLIPS with the new Hi-Center Saddles and extra-strength U Bolts



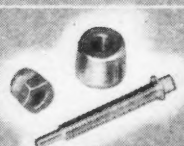
PIPE PLUGS, square head and headless; forged steel, heat-treated

LOK-THRED Studs and Pipe Plugs—Thread *locks* and *seals* in standard tapped holes

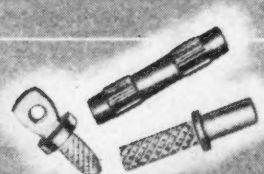


ROAD MACHINERY and other heavy equipment parts—high tensile and alloy fasteners

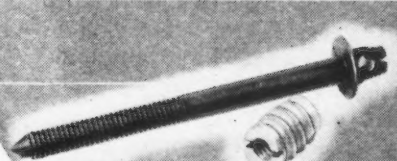
COTTER PINS of steel, brass, aluminum and stainless steel



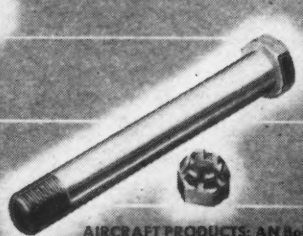
BICYCLE PARTS, from axles and saddle bolts to chain-adjusting screws



PLASTIC INSERTS—made to your specifications . . . in production quantities



FURNITURE BOLTS, Skein Nuts, Cabinet Bed Bolts and Bed Screws



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NLRB Charged With Campaign to Wipe Out Independent Unions

Washington

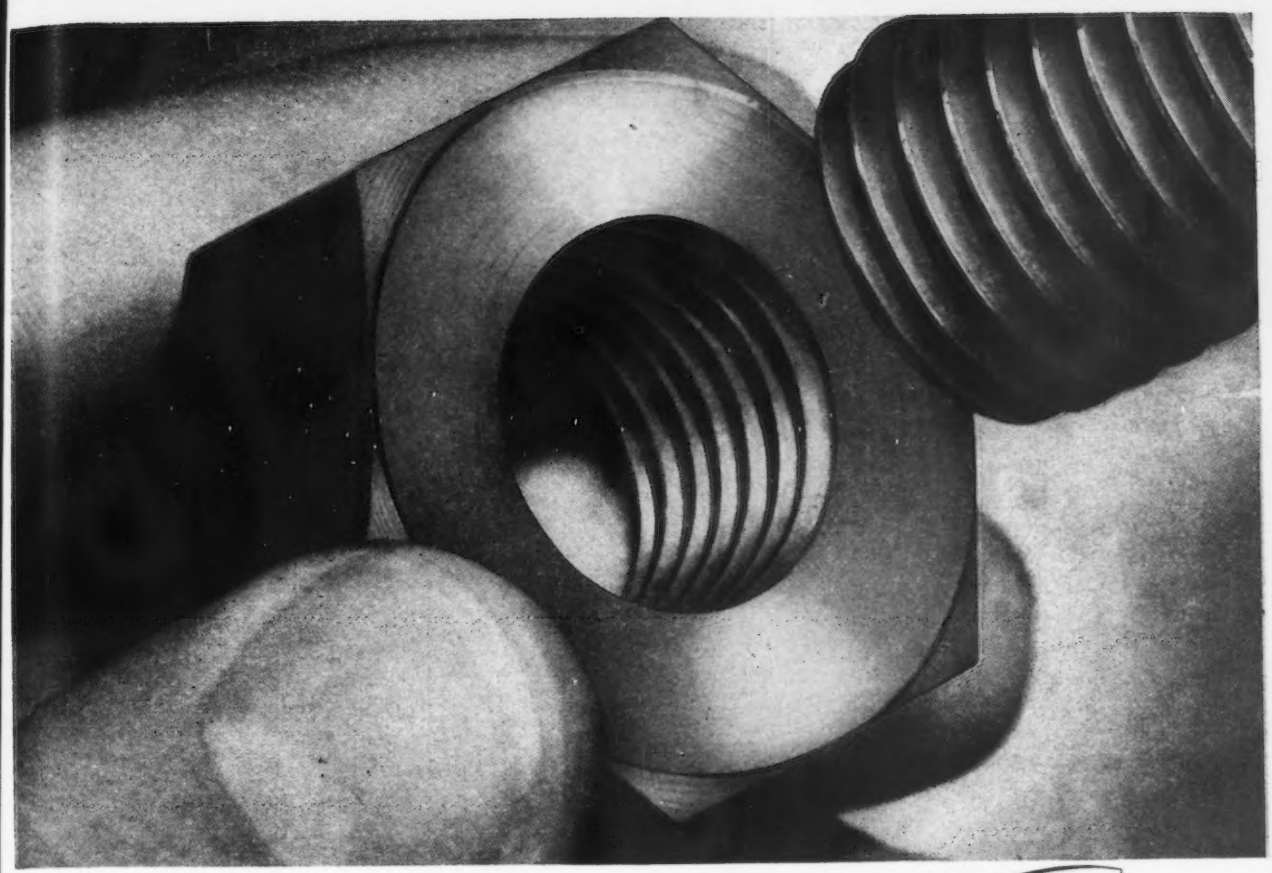
• • • **Charging the** National Labor Relations Board with conducting a campaign to wipe out independent unions, Earl F. Reed, Pittsburgh labor attorney, urged the Senate Labor Committee on Feb. 13 to amend the Wagner Act in a manner which would prevent NLRB from continuing this policy and also to eliminate the Board's practice of requiring the reinstatement of strikers long after a strike is actually over, even though the strike is not the result of an unfair labor practice.

Citing one of his clients, the Weirton Steel Co., as a prime example, Mr. Reed related to the Committee a long story of the government's attempts to wipe out the independent union which exists at Weirton.

Tracing this story back to an unsuccessful effort to wipe out this union before the Wagner Act was passed, Mr. Reed revealed that "in the last 13 years Weirton Steel Co. has been in court at the suit of the government or the Labor Board a total of 137 months, at a terrific cost." The Labor Board, Mr. Reed said, has tried in every way to wipe out the independent union existing at Weirton, even to installing Board representatives in the CIO union headquarters to coach paid CIO organizers as to the methods they should use to get on the company payroll in the company's shell plant.

Declaring that unrelated industries necessarily must follow the pattern established by basic steel producers, Edward S. Evans, Jr., chairman of the Non-Basic Steel Coordinating Committee, told the Committee that in the opinion of the 258 fabricating firms which he represented, industrywide collective bargaining must be outlawed. He held this necessary to guard against chaos, not only within the labor unions themselves but within the industries affected.

In substantiation of his stand, Mr. Evans cited the insistence of the USWA last year in including more than 1100 small companies, employing more than 350,000 workers, in union-wide bargaining



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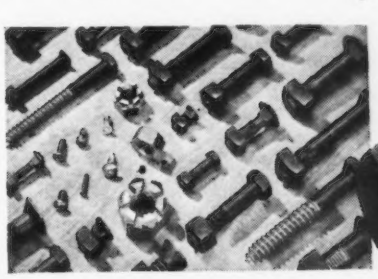

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and calling a strike to force the firms to meet the 18½¢ an hr increase of the basic steelworkers.

In opposition to Mr. Evans' testimony, Almon E. Roth, president of the National Federation of American Shipping, warned the committee that banning industry-wide agreements would create a diversity of wage rates and working conditions throughout the shipping industry and result in great unrest and dissatisfaction among workers on ships operating in the same areas and employing, in turn, the same men.

However, Mr. Roth favored a modified prohibition of the closed shop. It is particularly essential, he said, that the operators of vessels should have the exclusive right to determine qualifications, to hire and fire employees. The closed shop offers a most potent weapon in the hands of an irresponsible union leader, he said.

Asks Permanent Council For Labor-Management

Washington

• • • **The creation** by law of a permanent national management-labor council to make continuing studies of industrial relations is recommended in a statement of national policy made public today by the research and policy committee of the Committee for Economic Development.

Under the CED's proposal, the council, whose members would be appointed by the President, subject to confirmation by the Senate, would work with a greatly strengthened Federal Mediation Service, which the CED also recommends be established.

The proposed council would be required to report annually to the President on the state of industrial peace throughout the nation, to confer regularly with the Secretaries of Labor and Commerce and the chairman of the Senate and House labor committees, to advise the director of mediation on matters of policy and to approve the appointment of all mediators.

Two other recommendations, designed to make collective bargaining work better in this country, highlight the statement. One is

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For sheet steel products requiring paint or enamels, specify Continental GALVANNEALED. This highly rust-resistant zinc-coated sheet has a matte-like surface which "takes" and "holds" fine finishes without the need of costly preparatory treatments. Its high degree of workability saves time, encourages good workmanship.

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that no strike be called or strik vote taken until bargaining ha had a chance to function and th mediation service an opportunity to settle the dispute. The othe would require that difference arising from the interpretation o the terms of agreements be arbi trated.

Report Profits in '46 Normal in Relation To The National Income

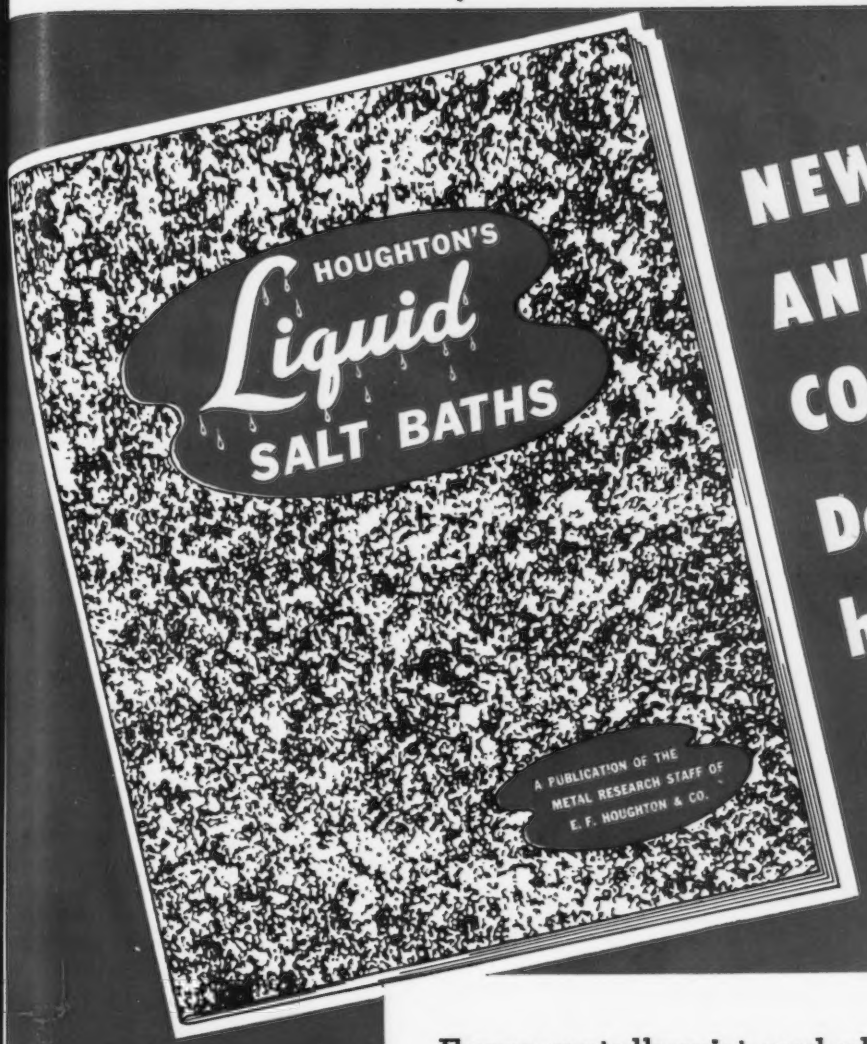
New York

• • • **Profits in 1946** were normal in relation to the national income and in line with long-term ratios for active years, according to Jules Backman and Martin R. Gainsbrugh in their chart survey of profits in the national economy which has been released by the National Industrial Conference Board.

During previous years of high level employment and production, the two economists declare, profits have averaged between 7½ pct and 8½ pct of the national income. As a result of the heavy income taxes levied against corporations, profits failed to reach this normal relationship during the war years. In 1946, after the excess-profits tax was repealed, total corporate profits were estimated at 7.3 pct of the total national income, or about in line with long-term ratios for active years.

All corporations had profits of 4.4 pct on sales in 1939 as compared with Nathan's ratios of 5.7 pct for the last quarter of 1946 and an average of 5.5 pct for the entire year, say Dr. Backman and Mr. Gainsbrugh. "When allowance is made for the fact that about a fifth of the sales were made by deficit corporations in 1939," they continue, "the relationship between 1946 and the prewar years is significantly altered. Thus, average profits on sales earned by profitable companies in 1939 was 7.6 pct. In light of the generally depressed conditions of the economy during these years, it is not probable that this return represented an excessive ratio.

"According to Nathan's estimates for manufacturing corporations, profits in the last quarter of 1946 were 5.6 pct of sales, and for the entire year, 4.8 pct. This, compares with an average of 5.1



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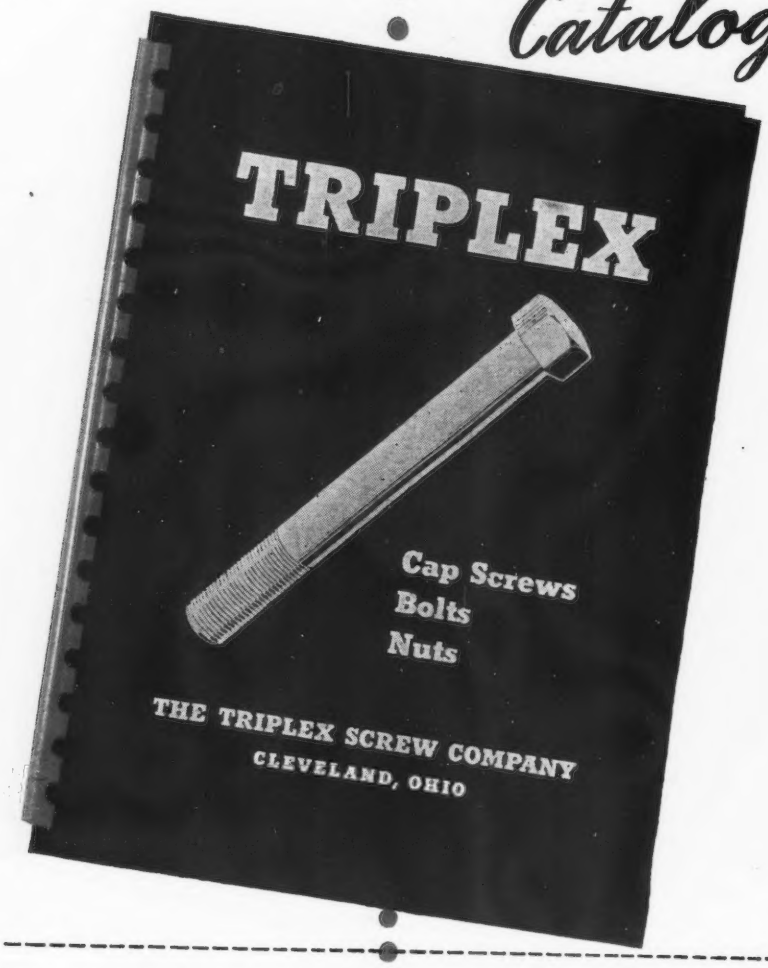

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pct for all manufacturing in 1939, 6.8 pct for the profitable manufacturing corporations in that year, and 6.3 pct for all manufacturing in 1929. Thus, while the dollar profits in 1946 were large, returns on sales were in line with past relationships. These figures belie the frequent charges that the elimination of price control has led to excessive price increases by industry."

Over the years 1909-1946, the economists show, corporations distributed to their stockholders $137 billion; wages and salaries paid to their employees amounted to $1,511 billion, or 11 times as much.

No bit of economic folklore has gained wider circulation than the idea that corporations retain 20 pct to 25 pct or an even greater share of the funds received from their customers, says Dr. Backman and Mr. Gainsbrugh.

Almost every public opinion poll, say the two economists, reveals that the public believes high proportions of profit are retained by corporations. But, they point out, "official data, taken from tax returns, show that over the years 1919-1943, the average profit per dollar of sales has been only 4.3 pct. In fact, the highest rate of profit on sales ever recorded was not greater than 7.3 pct."

Normally, the economists declare, a high proportion of all corporations operate at a loss. For the entire period 1916-1943, for which income tax statistics are available, approximately half of the companies have reported losses. Even in a boom year like 1929 there were 186,600 companies with deficits as compared with 269,400 with net income. Losses of the deficit corporations in that year aggregated $2.9 billion, as compared with the profits of $10.5 billion for the profitable corporations.

In the years 1936-1939, frequently cited as the last normal period for tax and other purposes, the number of companies with deficits outnumbered the profitable companies by more than 90,000. One-quarter of all sales in this so-called base period were made by companies which had deficits, and the aggregate of these deficits was $2.3 billion, as compared with the profits of $7.5 billion for the money-making com-

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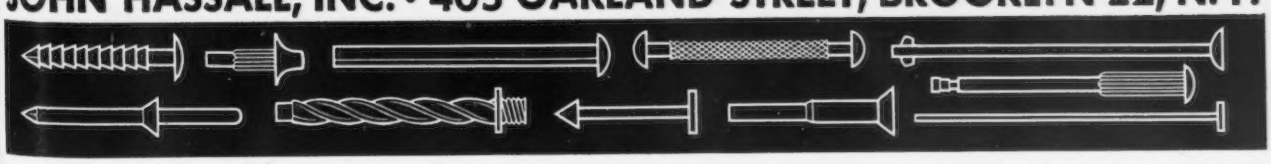

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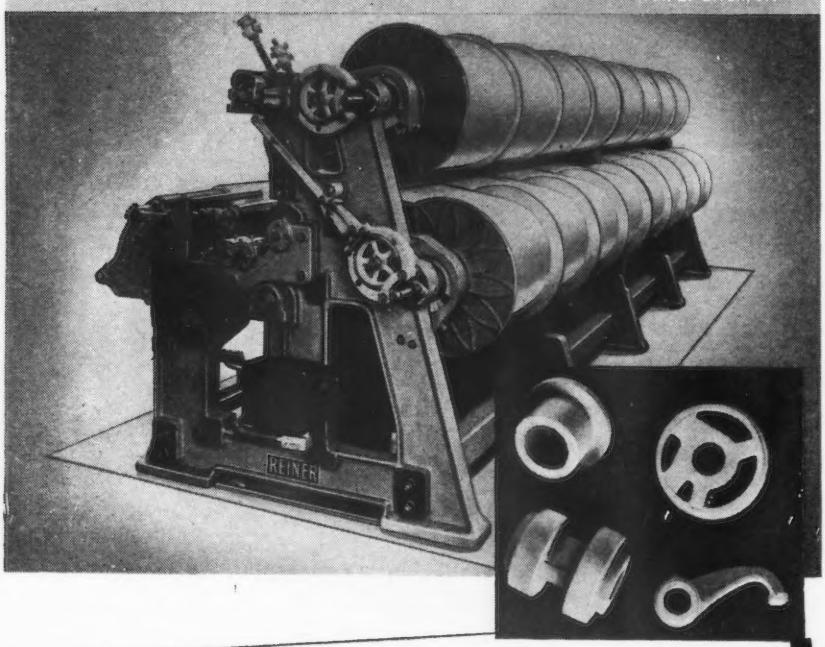

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Yet no two of these parts are of the same analysis, and among them three different basic types of Meehanite castings are represented. They include clutches that carry beams . . . gear hubs that provide locking action between spools and castings . . . rocker arms that move forward and backward at relatively high speeds and ground cams. All four of these castings possess excellent machinability with no distortion after machining in combination with one or more of these Meehanite properties: abrasion resistance, tensile and transverse strengths, toughness, impact resistance, wear resistance, vibration dampening and rigidity.

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panies. Even at the height of war production in 1943, 136,800 companies reported deficits, but their aggregate losses were only $900 million.

Manufacturing has received a declining share of the larger wartime and postwar profit pie, the two economists hold, while the distribution and service industries have taken larger slices.

Since 1939, manufacturing has accounted for a larger share of total civilian employment and has produced a greater proportion of the nation's income. Although total profits in manufacturing increased substantially above the prewar depressed levels, its slice of the total corporate profit pie has been steadily narrowed. In 1946, profits in manufacturing comprised about 50 pct of all corporate profits, as compared with 62.1 pct in 1939 and 53.2 pct in 1929.

Corporate profits go two ways, say Dr. Backman and Mr. Gainsbrugh. Part is distributed to stockholders, and part is retained either to finance expansion without borrowing, or to continue basic operations in times of depression. These "undistributed" profits represent corporate savings.

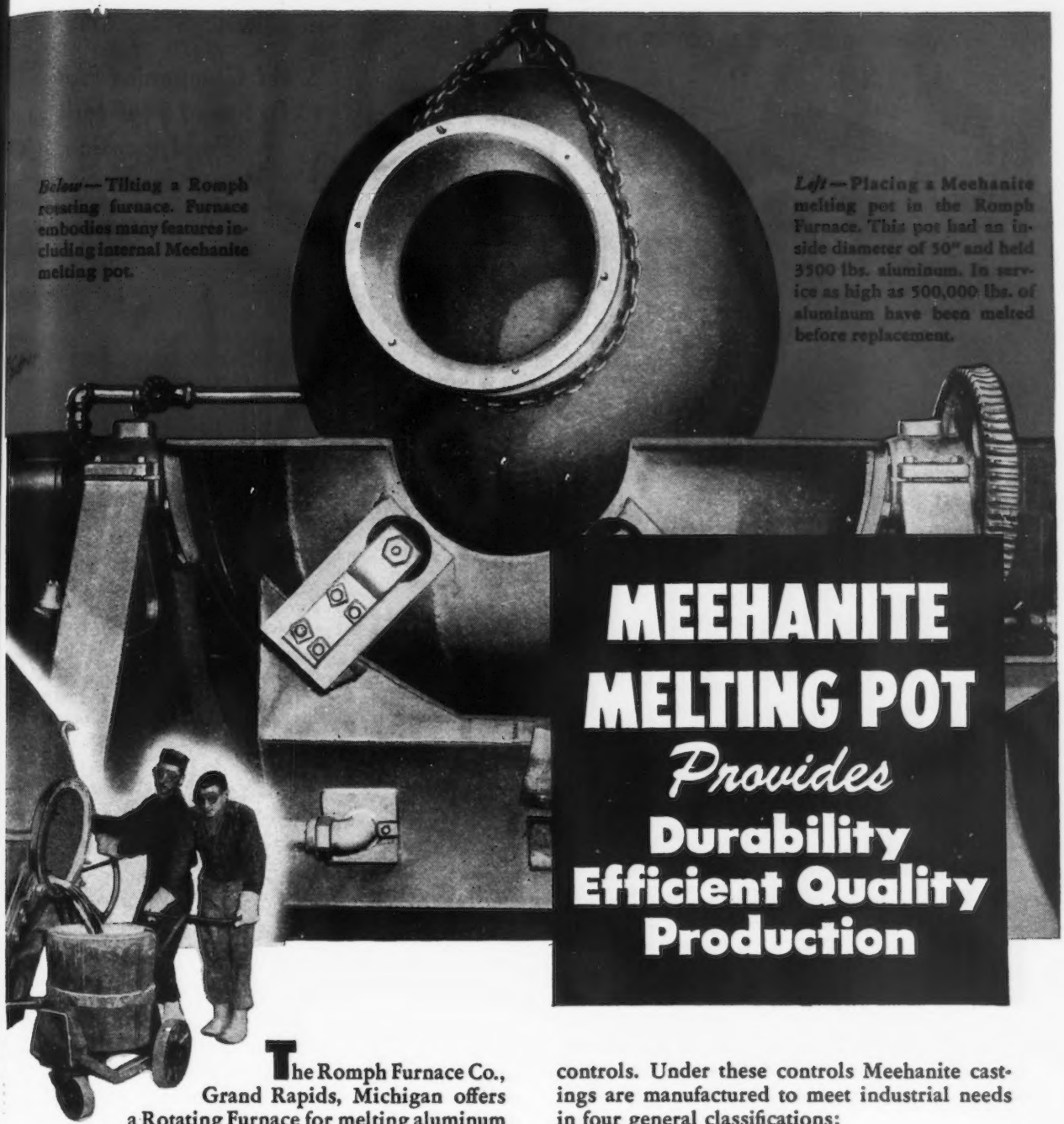
From 1930 through 1938, the corporate economy paid out each year more than it received from its customers. The cumulative amount of such corporate dissavings after payment of the modest dividends was $25.5 billion.

From 1939 through 1945, profitable operations were restored and corporate savings aggregated $26 billion, or approximately the amount dissaved from 1930 to 1938. Dividends paid out were not significantly different from those of 1939. For 1946, corporate savings are estimated at about $7 billion. Over the entire span of 1919-1946, corporate savings averaged less than $700 million annually.

HPM Net Earnings Up

Mt. Gilead, Ohio

• • • **Hydraulic Press Mfg. Co.**, reports 1946 net earnings of $431,347, equal to $2.44 a share on the 166,649 shares of common stock outstanding. This compares with net earnings of $146,641 for 1945. Net sales for the fiscal year ended Dec. 31, 1946 totalled $7,388,219 compared with $4,013,497 for 1945.



Below—Tilting a Romph roasting furnace. Furnace embodies many features including internal Meehanite melting pot.

Left—Placing a Meehanite melting pot in the Romph Furnace. This pot had an inside diameter of 50" and held 3500 lbs. aluminum. In service as high as 500,000 lbs. of aluminum have been melted before replacement.

MEEHANITE MELTING POT *Provides* Durability Efficient Quality Production

The Romph Furnace Co., Grand Rapids, Michigan offers a Rotating Furnace for melting aluminum with fast economical production of higher quality metal. The melting pot, specified in Meehanite contributes much to the long life, flexibility, and efficiency of the unit.

The properties of such a Meehanite casting determining its performance in service are achieved by careful regulation of each step in its manufacture from raw materials bins to shipping floor.

Better performance under service requirements is the objective of each and all Meehanite process controls. Under these controls Meehanite castings are manufactured to meet industrial needs in four general classifications:

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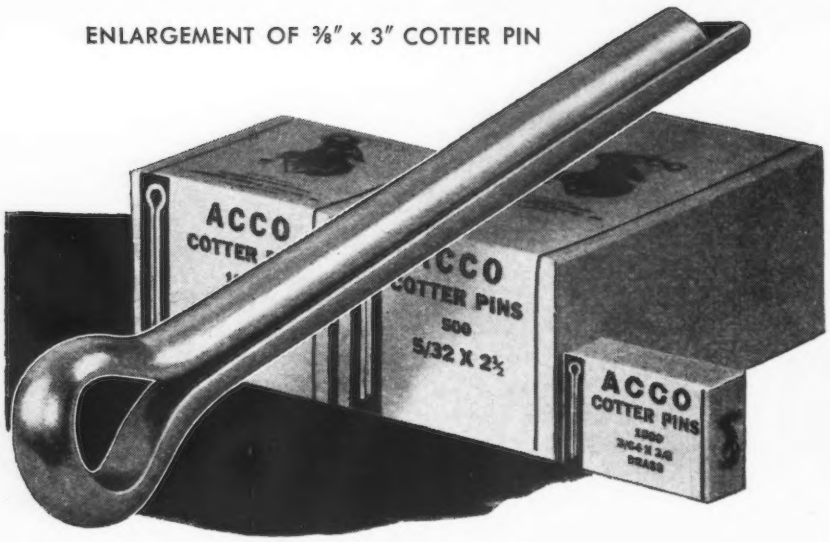

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YORK, PA.—American Chain makes two types of cotter pins in a full range of sizes. In addition to the ACCO (regular type, shown above) American offers the CAMPBELL HAMMERLOCK, which locks positively and permanently by simply striking the head with a hammer—a distinct advantage on a production line.

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Steel Companies Plan To Spend $448 Million For Expansion in '47

• • • **Steel companies** plan to spend a record amount, $448 million, in 1947 for new equipment and additional facilities required to satisfy current steel demands, according to a survey by the American Iron & Steel Institute. This represents a 54 pct gain over 1946 expenditures of $291 million out of a total original appropriation of $327 million. A portion of the 1947 funds represent a carryover from 1946, when strikes and shortages of materials delayed the delivery of much equipment which the steel industry had expected to install.

The 1947 appropriation brings to two and three-quarter billions the total amount spent by steel companies over the past 12 years in their programs to expand and improve their plants. From 1936 through 1946 such annual expenditures by the industry have averaged more than $200 million per year.

A large portion of the 1947 expenditures will be for expansion of the industry's capacity for sheet and strip steel. Other funds will be used in adaptation of facilities built by the government for war purposes and now owned by steel companies for peacetime use. The usual replacement of obsolete equipment and machinery accounts for most of the balance.

Turbine Pump Industry To Hold Meeting Mar. 7

Washington

• • • **Under the auspices** of the Federal Trade Commission the vertical turbine pump industry will hold a trade practice conference at the Stevens Hotel in Chicago, Mar. 7. Commissioner William A. Ayres will supervise the conference.

Among the subjects suggested for consideration at the conference are: Deceptive representations respecting the capacity, sufficiency, durability, utility, or value of products; deception as to rebuilt or second-hand products; commercial bribery; inducing breach of contract; defamation of competitors or false disparagement of their products; deceptive

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guarantees, warranties, etc.; selling below cost with intent and effect of suppressing competition; unlawful price discrimination; and procurement of competitor's confidential information by unfair means and wrongful use thereof.

After the conference, the proposed trade practice rules will be made available in appropriate form to all interested parties. Thereafter, a hearing will be held at which members of the industry and others having an interest in the proceedings will have opportunity to submit their views and suggestions concerning the proposed rules. All matters thus presented will be given consideration before the Commission approves and promulgates final rules.

Declares Annual Wage Guarantee Would Mean Drop in Employment

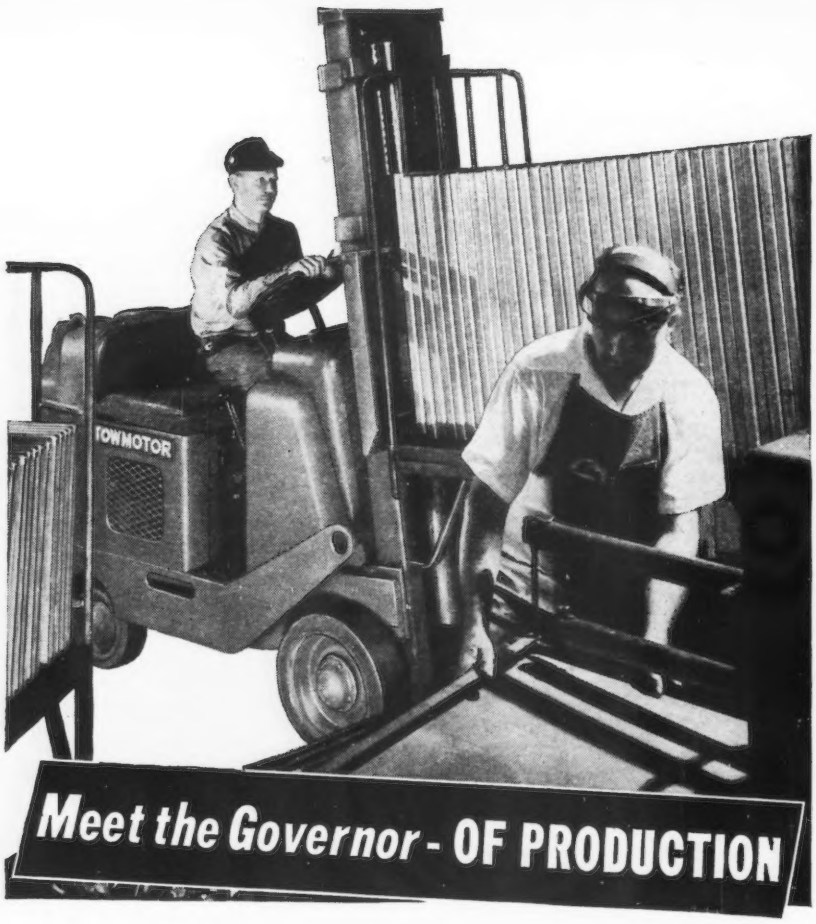
Washington

• • • **Current proposals** which start with industrywide guarantees of payrolls as a device for stabilizing economic conditions would actually result in a reduction of total employment.

Individual companies in some cases may so adjust production policies as to make annual wage commitments possible, but the imposition of wage guarantees across industry would introduce new factors of instability. It is in those industries with the greatest lack of employment security that the guarantee of industrywide annual wages is most likely to be self-defeating. It would bring postponement of reductions in output and employment, only to intensify their eventual severity.

These are some of the conclusions of a study of guaranteed annual wages conducted at the Brookings Institution by Dr. A. D. H. Kaplan, under a grant from the Falk Foundation, of Pittsburgh. The study is to be published in the near future.

In the search for means of reducing wage insecurity, there has been a temptation to draw unwarranted general inferences from the experience of a few firms where employment stabilization plans are in successful operation. Those concerns are almost en-



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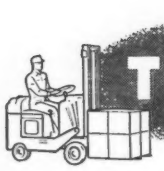
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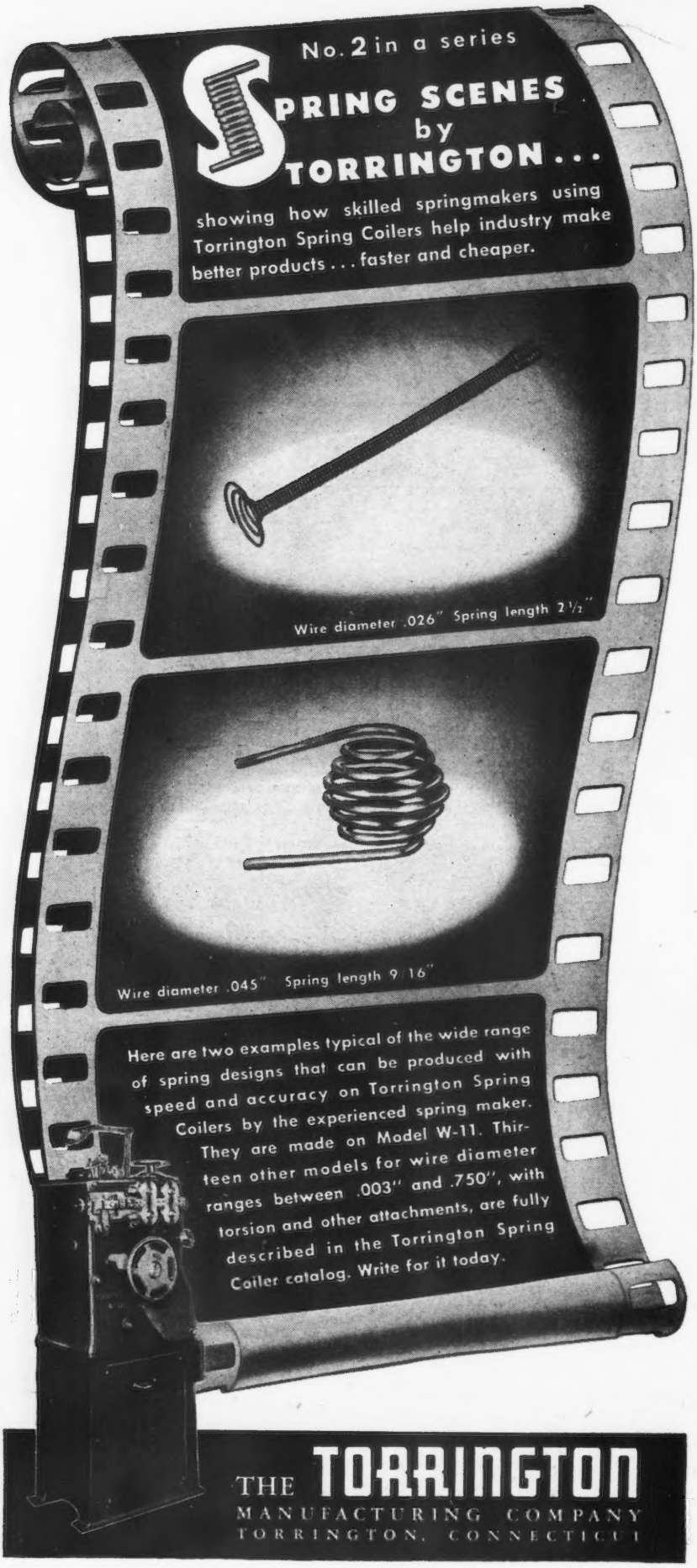
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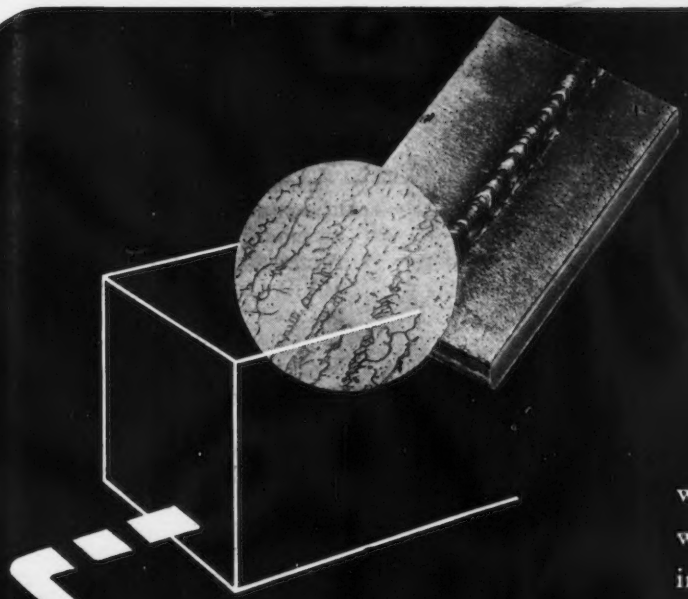
tirely in nondurable consumer goods; their seasonal and other short-term irregularities are predictable; wage payments of high and low weeks can be averaged; miscalculations in production or marketing can be adjusted within a limited time. The problem is vastly different where the timing and duration of changes are unpredictable, and where inventory accumulations may require a prolonged period for liquidation.

Furthermore, a single firm maintaining a wage guarantee plan can alter the character of its production so as to increase its own stability without regard to the effect on other enterprises. This flexibility disappears when all members of an industry are simultaneously employing similar defensive measures.

Impact on Business Policy. Should industry be placed under the obligation to carry its labor as a guaranteed overhead, it may be expected to react by resisting additional business that requires taking on new employees. Overtime for guaranteed employees and reserves against payroll commitments would further contribute to higher prices when business was brisk. On the other hand, the competition for orders to meet fixed overhead when business slackened would operate to intensify price cutting.

These tendencies would be least damaging to stable employment in an industry consisting of a small number of large firms accustomed to administered prices and well informed as to the shares of the companies in the total market. Such strong companies would likewise be in the best position to set up adequate reserves against payroll commitments and include additional labor overhead in the prices of their products. With small and highly competitive business, however, payroll contingencies are more likely to be met out of current funds, with exaggerated possibilities in cut-throat competition, overbuilding of inventories, discharges at the end of the guarantee period, and the crowding out of sub-marginal firms.

Impact on Labor. Organized labor is divided on the annual wage issue, with newer and war-expanded unions generally favoring the proposal, and with the older



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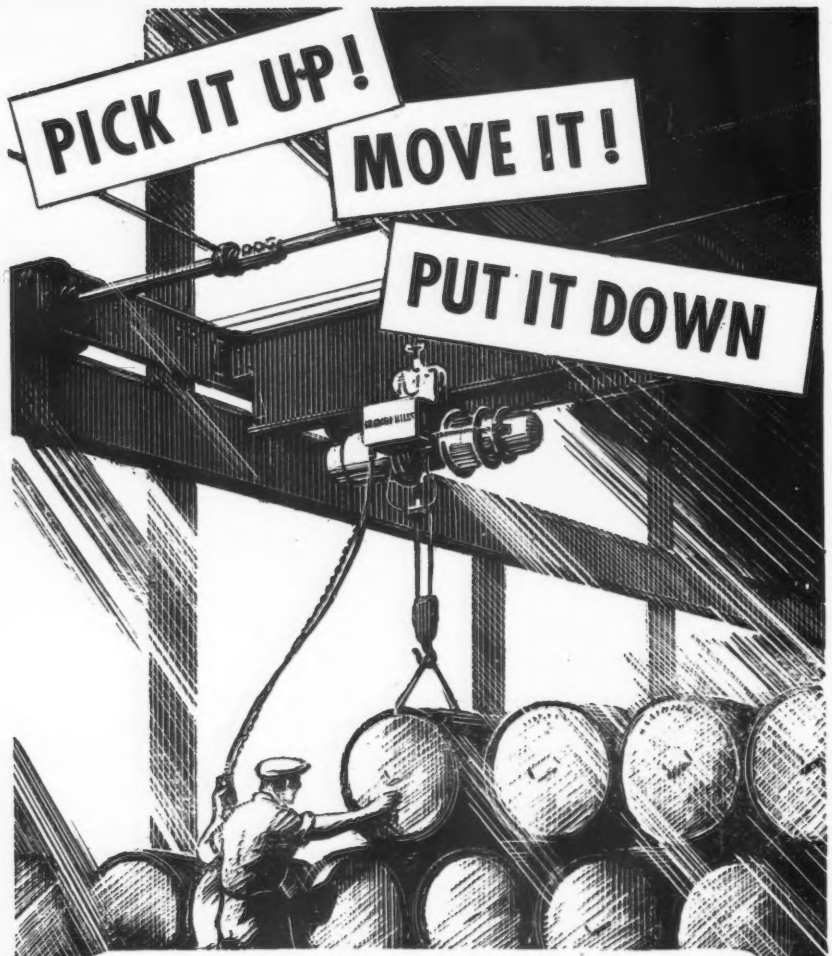

Every day, in thousands of businesses, there's the problem of moving heavy raw materials, semi-finished or finished products from one place to another. The heavier the weight the more chance there is to waste money, time and manpower. Only the most efficient crane will do.

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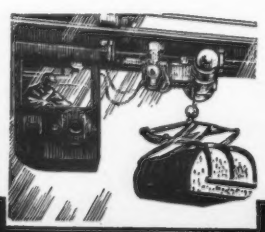

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Thousands of Shepard Niles electric hoists are giving continuous dependable service. There's a style and size to fit your problem of lifting, moving and depositing loads of 1 8 to 20 tons. Ask Shepard Niles engineers to recommend the style best suited.

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craft unions opposed. Industry-wide guarantees involve an agreement on the total employment the industry can guarantee, and the manner in which layoffs would be allocated if the guarantees must be modified. The accuracy of these forecasts would determine the ability to make good the guarantees.

The problems involved vary greatly from industry to industry. Where the elimination of periodic mass hiring and firing would be a boon to the workers in one industry, the elimination of temporary employees would destroy important areas of employment that depend on workers whose annual wages come from two or more seasonal or dovetailed occupations.

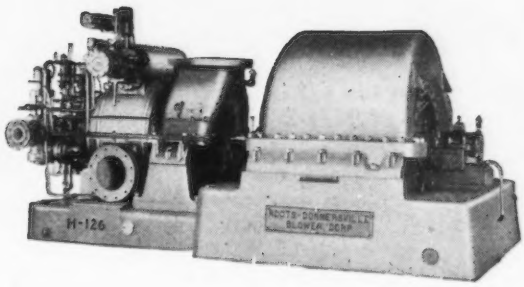
Consumer Demand. Wage guarantees would not solve the problems arising from shifting consumer demand. Much of the support for the annual wage comes from the belief that payroll guarantees by stabilizing consumer purchasing power, would thus stabilize production and employment. This overlooks the shifts in the flow of consumer incomes, especially as to durable goods, where insecurity of employment is concentrated. For example, in the 5-year upswing ending with 1929, consumer expenditures in the important area of residential building declined continuously, while industrial production and business capital formation was steadily rising. Periods of heavy consumer purchases of durable goods increase family installment obligations so that the fractions of income applied to the purchase of other commodities are thereby altered. These changes of consumer habits produce corresponding changes in the demand for labor.

Sustaining wage guarantees across industry would require the disciplining of consumers' choices so that they would purchase the kinds of goods for which sustained employment must be encouraged. It would also require controls to prevent new and improved industrial development from entering into conflict with lines already obligated to support full payrolls.

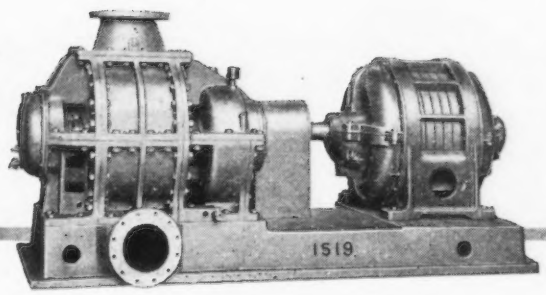
If supporting existing payrolls were to be the first consideration, preference would have to be given to established businesses in absorbing competing lines or im-

EQUALLY GOOD

at pushing



or pulling



Put a Roots-Connersville unit to work at forcing air into a cupola—delivering, exhausting or measuring gases in chemical processes—or creating a vacuum on a paper suction roll . . . you'll get fine performance marked by smoothness, economy and dependability.

Whether it's a thimble of gas for a shop forge or a hurricane of air in a test-tunnel, R-C *dual-ability* can deliver it. This *dual-ability* comes from our capacity to design and build either Centrifugal or Rotary Positive equipment. We combine almost a century of experience with advanced engineering to meet the precise requirements of today's jobs. And, we welcome those difficult problems peculiar to tomorrow's planning.

For your next job of pulling, pushing or proportioning air or gas, let R-C *dual-ability* supply a practical, performance-proved answer.

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ALMOST EVERY INDUSTRY CAN USE *R-C dual-ability*

The skill and experience of Roots-Connersville engineers in applying either Rotary or Centrifugal air and gas handling equipment extend into a wide variety of industries and the solution of many different problems. The following examples may suggest ways in which R-C *dual-ability* can help serve you. Ask us for details.

Blast Furnaces, Foundries, Steel Plants

Air for cupolas and other combustion processes; gas exhausters; gas meters; heat-treating and annealing.

•

Building and Construction

Blowers for tunnel ventilation; low pressure sandblasting; placing wall and ceiling insulation.

•

Sewage Treatment and Water Works

Activated sludge treatment; vacuum filtration processes; priming centrifugal pumps; aeration and carbonation processes; gas metering.

•

Pneumatic Conveying

Loading or unloading of trucks, ships, cars and barges; delivery of raw material; removal of finished products, waste and by-products.

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Blacksmith forges; air-operated musical instruments; steam garment presses; feather picking machines; bottle and tube filling; cooling cannery packs.

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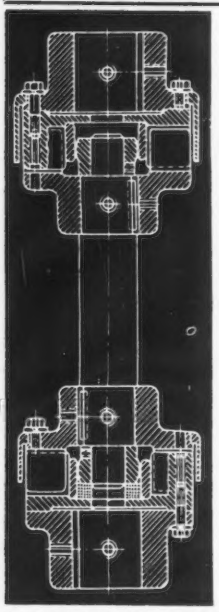
ALIGN DRIVE and DRIVEN UNITS *More Easily!*

for better correction of misalignment, shock, whip, end float, with



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Type "HKQ" Flexible Couplings

Large and small machines in iron and steel industries need protection afforded by LOVEJOY L-R Flexible Couplings. These rugged couplings insure constant power flow between drive and driven units, eliminate whipping of shaft ends at any speed. Quick disassembly without disturbance. 7 to 800 H.P.

OPERATING ASSEMBLY FOR VERTICAL or HORIZONTAL HEAVY DUTIES

The Lovejoy L-R Type HKQ Flexible Floating Shaft Coupling is applicable to either vertical or horizontal drives at various distances. Write for catalog and selector charts to help you determine quickly, the proper couplings for every type of service.

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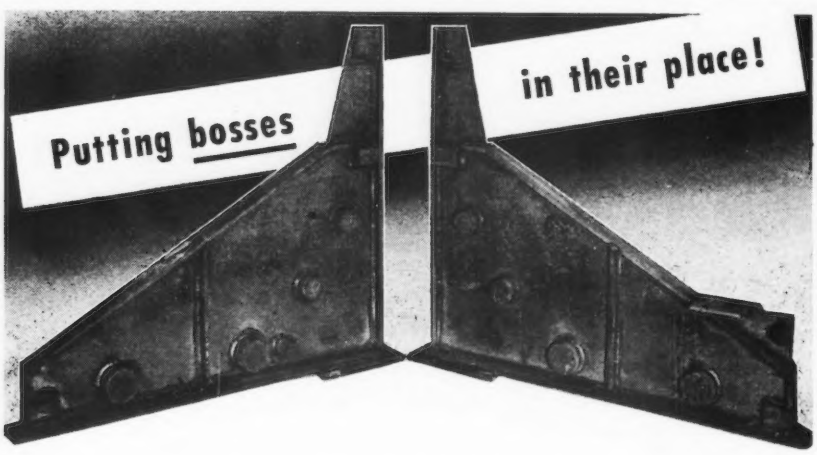
Also Mfrs. of Lovejoy-IDEAL line of mechanical power transmission equipment.



The "bosses" are those solid, cylindrical shapes you see welded to the sides of the above fabrications. And they're placed exactly right, for keeps. Because, they're drilled later to house rotating shafts—functional parts of the rolling machine for which these two coil supports are made. And don't be fooled by their overall, simple appearance. All flanges, pads, stiffeners, etc., are welded. There's a real knack to keeping light plate like this free from heat distortion—another Marbott specialty.

Heavy steel weldments
Flame cutting
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proved processes, so that such companies could allocate production according to their payroll commitments. This would tend toward enfranchisement of industrial monopolies whose primary goal would not be more goods for less money, but the stabilizing of employment for their respective labor forces.

In short, while the annual wage is a goal of which no company should lose sight, the imposition of the guaranteed wage upon all industry or key industries would tend to reduce the real income of both labor and capital.

Magnesium Meeting Is Told That Applications Are Increasing Widely

Dayton

• • • **Magnesium, one of the very few engineering metals of which the United States has a virtually inexhaustable domestic supply, is finding widely increasing use for peacetime industrial and consumer products, R. D. Taylor, president of the Magnesium Association, said in opening the first national magnesium exhibition held here at Wright Field, Feb. 18 to 20. Lt. Gen. N. F. Twining, commanding general of the AAF Air Materiel Command, predicted wider use of the metal in aircraft of the future.**

The magnesium exhibition, which was sponsored jointly by the Magnesium Association and the AAF Air Materiel Command, attracted an unexpectedly large attendance by industrial executives and engineers and military authorities. Some 40 companies exhibited a wide variety of military, industrial and consumer items ranging from heavy forgings to small precision cast parts. The exhibits served also to illustrate the wide variety of methods by which magnesium can be fabricated. Unusually interesting examples were shown of parts produced by forging, deep drawing, stretch forming, precision casting, stamping and spinning.

Products on exhibit ranged from large aircraft wing structures, through the gamut of industrial items, to such consumer products as lawn mowers, chairs and sandwich panels.

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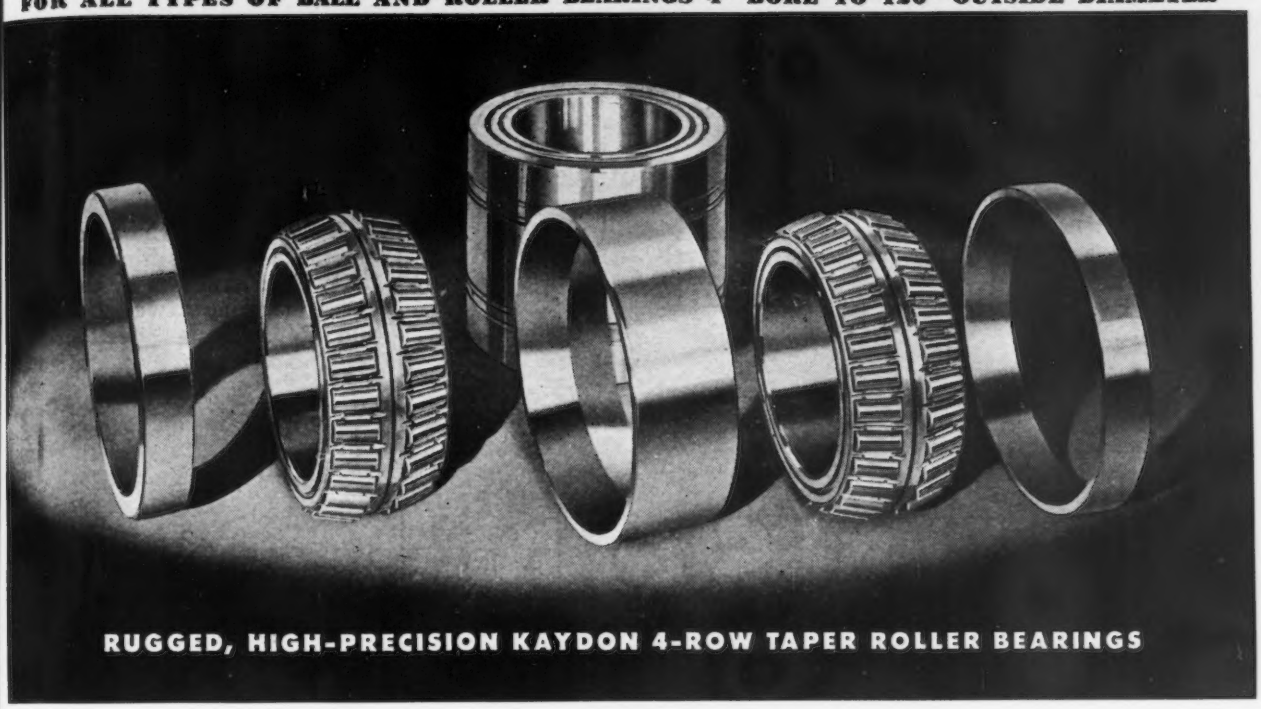
FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER



RUGGED, HIGH-PRECISION KAYDON 4-ROW TAPER ROLLER BEARINGS

Profit by KAYDON *Versatility . . .*

gain improved performance . . . longer machine life

WHEN KAYDON undertook the production of Gun Mount precision bearings as large as 120.000" (that's 10 feet) outside diameter, as part of a complete line ranging down to a size of 4.000" bore, in all types of ball and roller bearings, VERSATILITY naturally expanded tremendously.

New methods, new equipment, new laboratory and production controls were developed. No longer is it necessary for machine designers to compromise on a standard bearing that doesn't exactly fit the need. KAYDON versatility has provided a full line that is on a par with advanced engineering design for modern heavy-duty machinery . . . bearings that meet demands for improved performance, faster production, longer machine life.

In addition to capacity for all types and sizes of ball and roller bearings, KAYDON offers modern facilities for atmospheric controlled heat treating, precision heat treating, salt-bath and sub-zero conditioning and treatment, microscopy, physical testing and metallurgical laboratory services.

Counsel in confidence with KAYDON. Make the most of KAYDON's broad experience in bearing engineering for heavy-duty equipment in steel mills, paper mills, construction machinery, oil field and other equipment that is tough on bearings.

KAYDON *Types of Standard or Special Bearings:*

Spherical Roller • Taper Roller
Ball Radial • Ball Thrust
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Johnson Steel Spring Wire (XLO Music Wire) is available in a wide range of sizes from .003" (38,206 ft. to the lb.) up to .200" (9 ft. to the lb.). Produced with micrometer precision, this wire of a thousand uses—springs, wire forms, appliances—is available from Johnson sales offices.

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Reputations sell EUCLIDS

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Postwar demands are necessitating fast production schedules which are being met with the aid of Euclid Cranes and Hoists everywhere.

You will find in the Euclid Line a unit or units to meet your specific requirements.

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WRITE FOR CRANE CATALOG

Weekly Gallup Polls

(CONTINUED FROM PAGE 123)

among those with opinions in the major sections of the country:

	Favor Pct.	Oppose Pct.
New England and Middle Atlantic	54	46
East North Central	58	42
West North Central	69	31
South	54	46
Mountain States and Pacific Coast	55	45

The extent to which sentiment on the issue has divided along party lines is shown by the differences in voting among Democrats and Republicans questioned by field reporters in 1944 and today.

Today	Favor Pct.	Oppose Pct.
Democrats	41	59
Republicans	74	26
1944	**Favor Pct.**	**Oppose Pct.**
Democrats	32	68
Republicans	84	16

Ten years ago, when Roosevelt was at the height of his popularity, sentiment on the question was about evenly divided.

Here is a table giving the trend on the issue.

	Favor Pct.	Oppose Pct.
1937	49	51
1938	48	52
1939	42	58
1940	41	59
1943 (April)	46	54
1943 (Dec.)	54	46
1944 (April)	57	43
1945 May)	60	40
1945 (July)	58	42
TODAY	57	43

•

• • • A majority of American voters think it would be a good idea to place a limitation upon the number of terms a U. S. Senator can serve.

When asked what the limit should be, voters say, on the average, two terms.

This result coincides with a proposal of Sen. Edwin C. Johnson, Democrat, of Colorado. Senator Johnson has announced he will not run for a third term.

It is significant, perhaps, that people with college training interviewed on the issue vote in majority against any limitation—a result in contrast to people whose education did not go beyond high school.

Republicans approve the limitation by a larger proportion than Democrats in the poll.

The question asked in the survey:

"A U. S. Senator now serves 6 years in one term of office. Do you think there should be a limit on the number of terms which a Senator could serve?"

The results across the nation:

	Pct.
Yes	54
No	39
No Opinion	7

The people voting yes to the first question were then asked:

"What do you think the limit should be?"

The median average of all replies comes out at two terms.

Sentiment on the first question is shown below by ages of people in the poll, by education, by political preference.

	Yes Pct.	No Pct.	No Opin. Pct.
POLITICS			
Democratic	50	42	8
Republican	58	38	4
AGES			
21-29	49	45	6
30-49	52	41	7
50 & over	61	33	6
EDUCATION			
College	40	58	2
High Schol	55	41	4
Grammar School or Less	58	33	9

London Economist

(CONTINUED FROM PAGE 129)

operation, the World Trade Foundation, the Committee on Foreign Economic Relations.

But they have so far failed to make a cooperative approach to their needs for money and personnel, and there is a certain polarity among their more prominent personalities. Their efforts are consequently more overlapping and less cumulative than might otherwise be the case, particularly as respects a campaign across the country.

At the hearings, moreover, the overall interest of the general foreign trade organizations is only sporadically supported by the specific pleas of groups like the National Council of American Importers and individual firms seeking outlets for their goods abroad. The rarity of appearances in the latter category may indicate that many industries are unaware of the possibility of getting the bargaining power of the United States used to obtain reductions of duties, quotas, and preferences that obstruct the entry of their products into other countries. Or it may reflect satisfaction with current private arrangements

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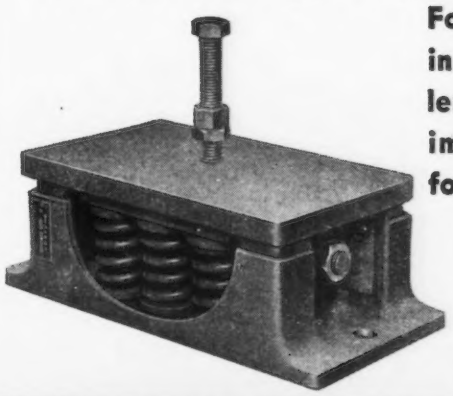
Saves Your Building, Too

Vibration from heavy impact and reciprocating machinery can cause permanent damage to the walls and floors of your factory building.

Vibration isolated and controlled by Korfund Vibro-Isolator Units is no longer a danger to the building. Just as Vibration Control saves your machinery, so does it prevent building damage. The working force of impact machinery is not diminished, but the vibration shock is blocked by the isolators and prevented from entering the building structure.

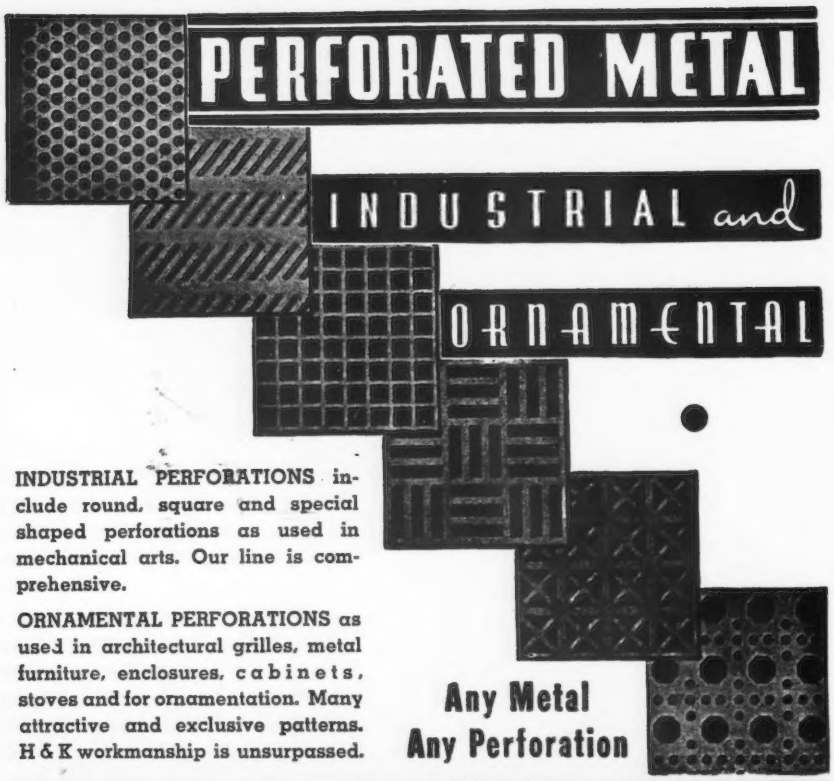
Korfund offers you Engineered Vibration Control. Forty years of experience in solving vibration problems can be applied to your immediate needs. Write for complete information.



Korfund-designed Vibro-Isolator Units of all materials are available. At left is shown Type LK, a steel spring Isolator with adjustable resilient chocks at the corners to act as stablizers.

KORFUND
VIBRATION CONTROL

THE KORFUND COMPANY, Inc., 48-35 32nd ST., LONG ISLAND CITY 1, NEW YORK



INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furniture, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns. H & K workmanship is unsurpassed.

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Any Perforation

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worked out by firms well related to various cartels.

But the balance of present testimony may be gaged by the introduction into the House of Representatives, within a few days of each other, of four resolutions. These offerings, advanced by Messrs. Jenkins of Ohio, Gearhart of California (both members of the influential Ways and Means Committee), Murray of Wisconsin and Lewis of Ohio, urge delay in trade agreement activity, an investigation of the administration of the program, the assessment of pertinent information by Congress, etc.

The bills in the House (to repeal the Trade Agreements Act) and in the Senate (to require Senate ratification of each agreement), perennially introduced by Congressman Read of New York and Senator McCarran of Nevada, probably stand little likelihood of passage.

But on the record of a number of influential members of the House Ways and Means Committee, to which, as concerning a revenue measure, the recent resolutions will go, the chances of a favorable Committee report and hence reference to the Rules Committee—the next stage on the road to the floor of the House itself—appear favorable, although Mr. Clayton, the Under-Secretary of State, may request a hearing before the vote is taken in an attempt to kill the resolution at the source. If they get to the Rules Committee, that may be a rather easier nut to crack and another round of personal appearances might suffice.

The action that the House itself would take, if the resolutions got as far as that, is difficult to prophesy. There are many new members whose attitude is unknown. Many Democrats are in favor of protective tariffs.

Moreover, the official Republican attitude on this aspect of foreign policy has been a question mark since Senator Vandenberg's broadcast on Jan. 19 in which, after saying that "there is no longer any partisan politics in the fixed and united American foreign policy," he added that "probably we shall ask more questions" in the realm of economic cooperation.

We are bound to inquire of the world to what extent we are to be

required to face State monopolies abroad in trade.

We are bound to inquire to what extent other countries are going to continue to make bilateral trade agreements for political purposes instead of multilateral agreements such as we are committed to.

A resolution of the House, of course, does not bind the executive in the same way that a bill passed by both Houses does unless it is successfully vetoed. But suppose a resolution demanding delay of the reciprocal negotiations scheduled for Apr. 8 were passed. And suppose, at the cross-country public hearings on the ITO charter which started across the country on Feb. 25, testimony should come predominantly from opponents of the plan.

The bargaining position of the American representatives at Geneva could then hardly be more than negligible—the other delegations might relevantly inquire just what they could accurately claim to represent. The effect of such a situation, nullifying 2 years of American initiative, would be felt not only by the ITO, which has not yet come into being, but by the International Bank and the Monetary Fund.

Mr. Clayton and the staff at work on the RTA program, whose concern at the present trend of events is clear, may remember the Presidential torpedoing of an International Economic Conference once before, just after the political balance of the country had changed. But the memory can hardly make them more eager to go to Geneva, 9 weeks from now, subject to a Congressional April fool.

Puts Terminals on Sale

Washington

• • • **Two rail-water terminals and a 200-mile pipeline in Florida, constructed during the war, have been put on the block by WAA.**

The terminals are located near Panama City and Jacksonville and cost the government approximately $5 million. The pipeline was used to transport petroleum products from Timber Island, near Carrabelle, to barge terminal facilities on the St. John's River near Jacksonville. It cost $4.2 million.

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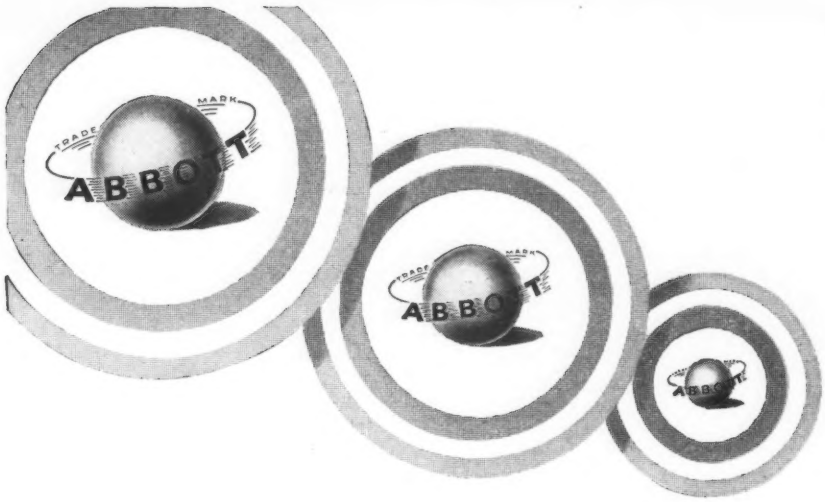

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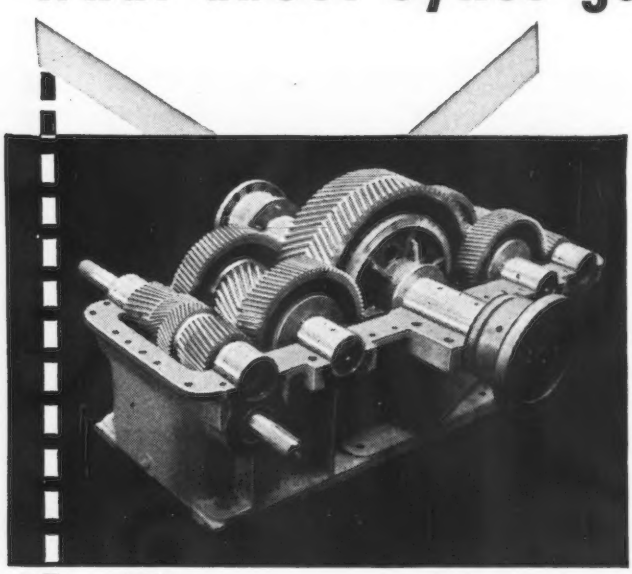

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Says Free Purchasing Of Foreign Goods More Beneficial Than Loans

Chicago

• • • **The well-being of** America will benefit more from free purchasing of foreign goods and services than from extending loans to needy countries, John L. McCaffrey, president of International Harvester Co., told the 11th annual Chicago World Trade Conference conducted jointly by the Chicago Assn. of Commerce & Industry and the Export Managers Club of Chicago. In order to buy American goods, the war devastated nations of Europe will need either trade or loans, the speaker said, and added "It will lessen the threat of inflation and will be a much smaller strain on our national resources to assist these countries by importing freely than to try to finance them through government or private loans."

Experience has shown that many such loans, the speaker said, are bad risk and cannot be repaid. He added, American taxpayers, who supply funds for government loans should not be fooled. They should know what loans are in the interests of good business and which loans are pure charity.

Mr. McCaffrey termed it a "remarkable fact" that some loans that the American people will approve turn out to be bad loans because the same people who approve them also approve the continuation of high tariffs that bar goods of the loan-receiving nations from this country. Such operation, Mr. McCaffrey said, "result in futility." He continued with, "I favor the reciprocal trade treaty program most strongly, because I believe the program embodied in the act is desirable if not absolutely essential, in the interests of world peace.

"While there are many factors involved in the causes of war, I believe it is true that economic strains and discontent in any nation or group of nations are among the most powerful irritants." Mr. McCaffrey told the group that he was of the opinion that we all recognize that free trade internationally is not a practical possibility at present and that tariffs can and sometimes do serve useful purposes. However, he continued, "unnecessary or unreasonable tariffs arbitrarily limit the opportunities

of all nations to develop their resources and aptitudes fully and to raise their standards of living.

"That is true not only of the so-called poor nations but also of our own wealthy and powerful nation. The problems of international trade should not be approached with the idea that the United States has reached its maximum development or that it has nothing to gain and everything to lose. In my opinion, the United States can and will develop much more and can and will go on to greater prosperity than it has ever known."

To accomplish this, the speaker said, "The United States must expand its foreign trade both from a spirit of friendliness and self interest. Enlarging of the United States foreign trade should also enlarge economic opportunities of foreign countries and thus, benefits would be mutual and would be lasting." Mr. McCaffrey said that several factors now block the way to free foreign trade. He mentioned that international trade has always been too involved in government red tape and it does not appear that the international trade agreement now being formulated is going to simplify matters.

Another difficulty, he said, lies in monetary exchange. He was hopeful that some of the artificial restrictions in foreign exchange can be at least partially corrected when the Bretton Woods plan and the international monetary bank are in operation. Among other factors working against the sale of foreign goods in the United States, Mr. McCaffrey told the assembly, are a lack of merchandise that appeals to Americans and the lack of any real selling effort.

Passenger Car Sales To Hit 45 Pct of 1941

Detroit

• • • **Indications that new passenger car registrations in 1947 will approximate 45 pct of the 1941 total and new truck registrations will approximate 96 pct of the 1941 figure were seen in the latest tabulation by R. L. Polk & Co., Detroit, statisticians for the automotive industry.**

December passenger car registrations are running 40,000 ahead of the totals for the same states in 1941, Polk said.

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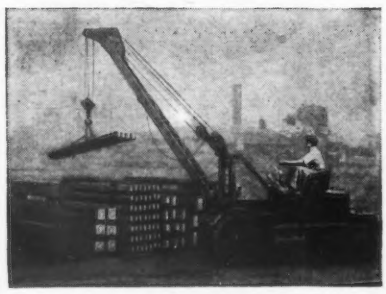

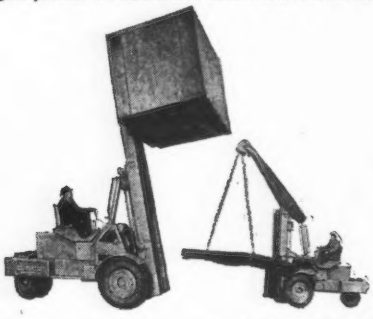

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Announces Selection Of Max Kuniansky To Head AFA for 1947-48

Chicago

• • • **Max Kuniansky,** vice-president-general manager, Lynchburg Foundry Co., Lynchburg, Va., has been nominated for president of the American Foundrymen's Assn. in 1947-48, Chicago headquarters of the 9000-member technical society has announced. Nominating committee selection to succeed Sheldon V. Wood, president of Minneapolis Electric Steel Castings Co., whose term expires in July, Mr. Kuniansky is AFA vice-president. He completed a 3-year term as a director in 1946.

Max Kuniansky

William B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, was named for vice-president. He served as a director in 1943-46.

William B. Wallis

Regular-slate nominees for 3-year terms as directors are E. N. Delahunt, general superintendent, Warden King, Ltd., Montreal; William J. MacNeill, general manager, G.H.R. Foundry Division, Dayton Malleable Iron Co., Dayton; Russell H. McCarroll, director of chemical and metallurgical engineering and research, Ford Motor Co., Dearborn, Mich.; John M. Robb, Jr., resident manager, Hickman, Williams & Co., Inc., Philadelphia, and A. C. Ziebell, president and treasurer, Universal Foundry Co., Oshkosh, Wis.

On his retirement as president, Mr. Wood will serve a 1-year term as an AFA director, succeeding F. J. Walis, International Nickel Co., Detroit, the association's immediate past president.

Directors whose terms expire in July are F. J. Dost, Sterling Foundry Co., Wellington, Ohio; S. D.

Russell, Phoenix Iron Works, Oakland, Calif.; R. T. Rycroft, Kencroft Malleable Co., Inc., Buffalo; Joseph Sully, Sully Foundry Division, Neptune Meters, Ltd., Toronto; F. J. Walls, and L. C. Wilson, Reading, Pa.

The association will hold its 51st annual convention and election in Detroit Apr. 28 through May 1.

Members of the 1947 nominating committee are F. J. Walls, chairman-designate; M. E. Brooks, Dow Chemical Co., Bay City, Mich.; R. S. Davis, National Malleable & Steel Castings Co., Indianapolis; N. J. Dunbeck, Eastern Clay Products, Inc., Jackson, Ohio; R. F. Harrington-Spiller Mfg. Co., Boston; Harry Ladwig, Allis-Chalmers Mfg. Co., Milwaukee; J. J. McFadyen, Galt Malleable Iron Co., Ltd., Galt, Ontario; R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., and E. C. Troy, Dodge Steel Co., Philadelphia.

Says Fate of Private Enterprise Will Hinge On Success of ITO

Chicago

• • • **Clair Wilcox, director,** office of international trade policy, U. S. Dept. of State, in an address at the 11th Chicago World Trade Conference, conducted jointly by the Chicago Assn. of Commerce & Industry and the Export Managers Club of Chicago, declared that the fate of private enterprise is at stake in the success or failure of the American sponsored international trade organization. "If the American program for world trade were to fail, this failure would hasten the spread of nationalization among other countries of the world," Mr. Wilcox declared. He said further, "If private enterprise is to survive abroad, it must be afforded an opportunity to live and grow. If that opportunity is denied, it will almost certainly be doomed."

The conference was informed that we cannot insulate ourselves against the movements that sweep around the globe and that if every other nation on earth were to go socialist it would be extremely difficult if not impossible to preserve real private enterprise in the United States. "There may be those, who

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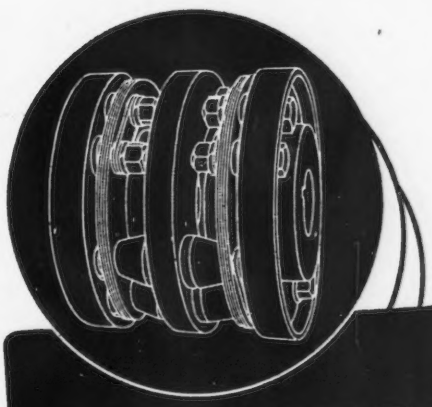

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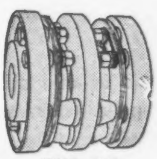
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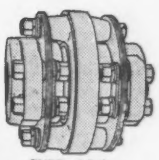
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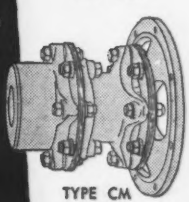
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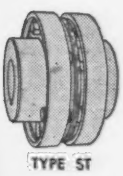
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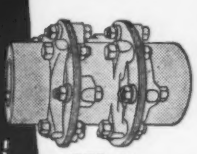
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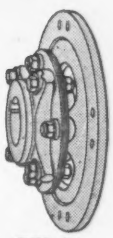
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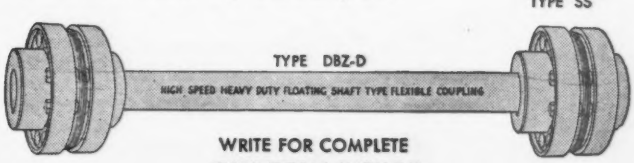

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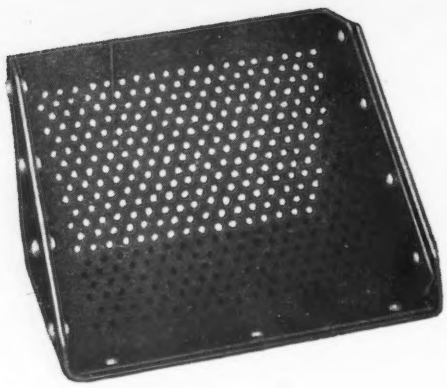

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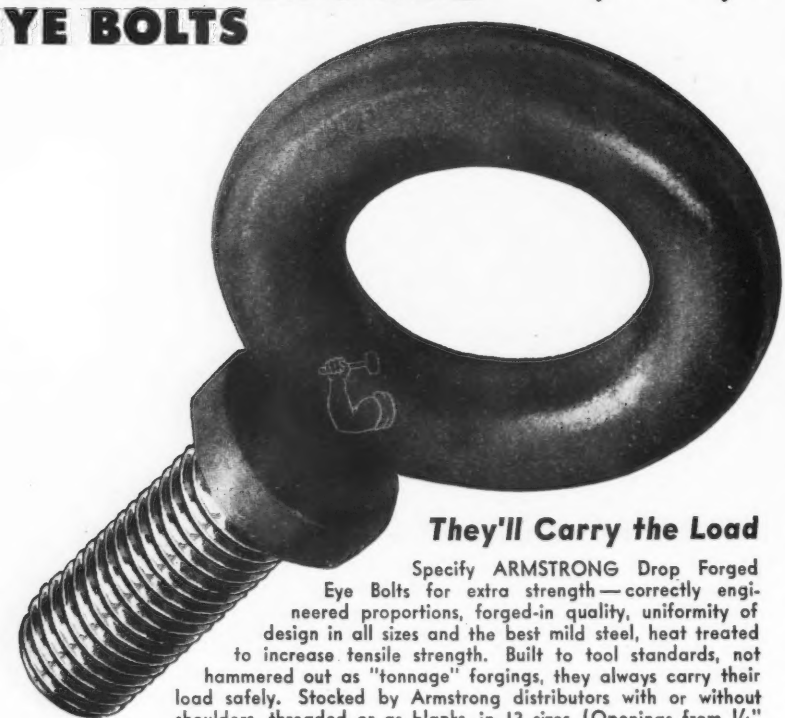

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say that we should let the rest of the world stew in its own juice," Mr. Wilcox continued, "but that is the one thing that we cannot afford to do."

Mr. Wilcox believes the United States must back the world trade program, because this nation led the movement toward world trade agreement and the international leadership of the United States would be jeopardized if it withdraw support now." According to the speaker, failure to support the program would increase foreign trade difficulties and so restrict trade because, if the plan fails, national security might be endangered by export quotas that other nations might set on exports to America of chromite, manganese, tin and other materials essential to the defense program.

The speaker said that the international trade program, "is based on the belief that we should be weaker if we attempt to isolate ourselves from the other nations of the world and stronger if we bind their economics to ours with ties of trade. He continued that despite these factors many interests object that the world trade program will open the gates to cheap foreign goods. He admitted that there was some danger of this but termed this point overstressed. "It is the purpose of the trade program to make the market grow," the speaker asserted, "and with all major competitors economically weakened by the war, the United States is in a good position to profit from the world trade even though imports of foreign goods might decrease the domestic market for American made goods." The director of OIT told the conference that if world trade expands, both foreign and domestic producers might increase their sales and a producer who had 90 pct of a domestic market worth $100 million would profit if he had only 80 pct of a world market worth $150 million.

In closing, Mr. Wilcox stated that the international trade organization is designed to complete the structure of international cooperation in economic and political affairs with each participating nation to give a pledge of economic nonaggression. Tariffs are to be reduced and various discriminatory practices and barriers to trade eliminated.

Alcoa Bids $5 Million For the St. Lawrence U. S. Aluminum Plant

Pittsburgh

• • • **The Aluminum Co.** of America made a firm offer on Feb. 21, 1947, of $5 million for the outright purchase of the government-owned "St. Lawrence" aluminum reduction plant adjoining Alcoa's own plant at Massena, N. Y., according to R. T. Whitzel, works manager for Alcoa at Massena. The company's offer, Mr. Whitzel said, was based entirely on the economic value of the Massena government-owned plant to the company through transference to that location of some of the operations now being carried on in its older plant at Massena, rather than on any appraisal of the original cost of the government-owned plant. The advantages of such transfer, Mr. Whitzel hopes, would outweigh the necessity of carrying idle facilities in the old plant at Massena which would be replaced by the newer facilities acquired through the government purchase.

Acquisition by Alcoa of the modern facilities at the St. Lawrence plant should be helpful in maintaining a steady flow of aluminum production, and consequently, employment, at this location, Mr. Whitzel stated.

The government-owned plant was constructed during the war period at a cost of $19,953,000 as a part of the government's program to expand aluminum producing facilities to win the war. The plant was built under severe climatic conditions during the winter of 1941-42. It was constructed without fee or profit by Alcoa for the government on a forced schedule required by the then-existing emergency. The plant was operated by Alcoa during the war. Since then a large amount of the bus bar system and other equipment have been removed for use in other government owned aluminum plants. To replace equipment and to put the St. Lawrence plant in full operating condition, Alcoa estimates it will require an additional expenditure of approximately $3,500,000.

The government-owned plant at Massena, according to a report of the War Assets Administration dated Feb. 12, 1947, was to have been offered to Alcoa subject to

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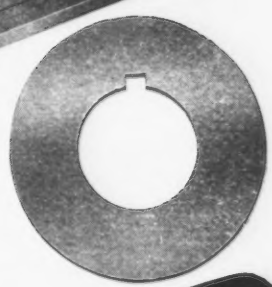

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CINCINNATI 23, OHIO, U. S. A.

the approval of the Attorney General. It was stated in this report that "it is possible that in the future Alcoa may be interested in acquiring the plant."

There remain five aluminum reduction plants, valued at $103 million, yet to be disposed of by the War Assets Administration. These plants are located at Burlington, N. J.; Los Angeles; Maspeth, N. Y.; Riverbank, Calif.; and the St. Lawrence, Massena, N. Y. plant. The Maspeth plant is now being used by the Navy in conjunction with the Brooklyn Navy Yard and will be held at least until January, 1948.

Diesel Engine Group Plans One-Week Course

Chicago

• • • An intensive, one-week educational conference for college and university professors who teach courses in diesel engineering has just been announced by the Diesel Engine Manufacturers Assn. at its Chicago office. T conference, combining tours diesel engine factories, visits mechanical engineering sch laboratories, and classroom le tures, is the first of its type ev to be given.

During the week of June 23, professors from all sections of t country will headquarter at C cago's Hotel LaSalle. They w follow a program that includ visits to engineering laborator of the Illinois Institute of Tec nology and of Northwestern U versity, and factory tours of t General Motors plant at LaGran and the International Harvest Company in Chicago. Supplemen ing these inspection tours w be classroom talks on vario diesel engine topics.

No entrance fee will be charg for the course, according to G don Lefebvre, chairman of t association's educational commi tee, but the enrollment will b limited to 50. Applications w be handled in the order they a received, Mr. Lefebvre said.

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Blaw-Knox to Construct Wisconsin Power Plant

Pittsburgh

• • • **The Power Piping div. of** Blaw-Knox Co. received a contract from Dairyland Power Co-Operative for the supply, fabrication and field erection of all piping, including hangers and supports, required for a new power generating plant to be constructed at Alma, Wis.

The new power station, designed by the Vern E. Alden engineering firm of Chicago and financed through Rural Electrification Administration, will enable more extensive mechanization of dairy farming and processing in that area.

The plant will have two boilers, each with 200,000 lb per hr steam output, and two 18,000 kw turbogenerator units. Main steam pressure will be 875 lb psi at 900° F.

The amount of the Blaw-Knox contract is approximately $300,000. Construction of this project is being started at once so that power will be available before the next winter season.

Sells Radio Tube Plants

Washington

• • • **Sale of two** radio receiving-tube plants has been announced by WAA. One, located at Bowling Green, Ky., was sold to the Electra Voice Corp. for $781,000. The other, located at Tell City, Ind., was sold to General Electric Corp. for $851,000.

The Bowling Green plant cost the government about $1,061,481; the Tell City plant about $1,032,585. Both were operated during the war by General Electric.

To Open Bids on Foundry

Washington

• • • **Bids for the** purchase or leases of an open hearth and electric steel foundry in Pittsburgh, Calif., will be open in WAA's regional office in San Francisco on Mar. 18, WAA has announced. The foundry was leased and operated during the war by the Columbia Steel Corp. The plant cost the government about $8,500,000 and has an annual rated capacity of 30,000 net tons of castings.

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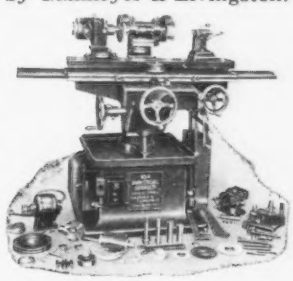

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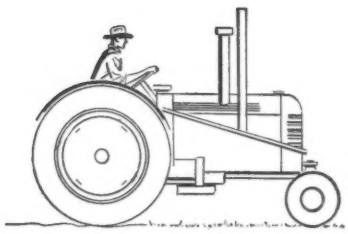

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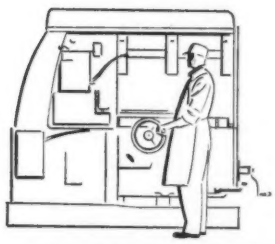

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